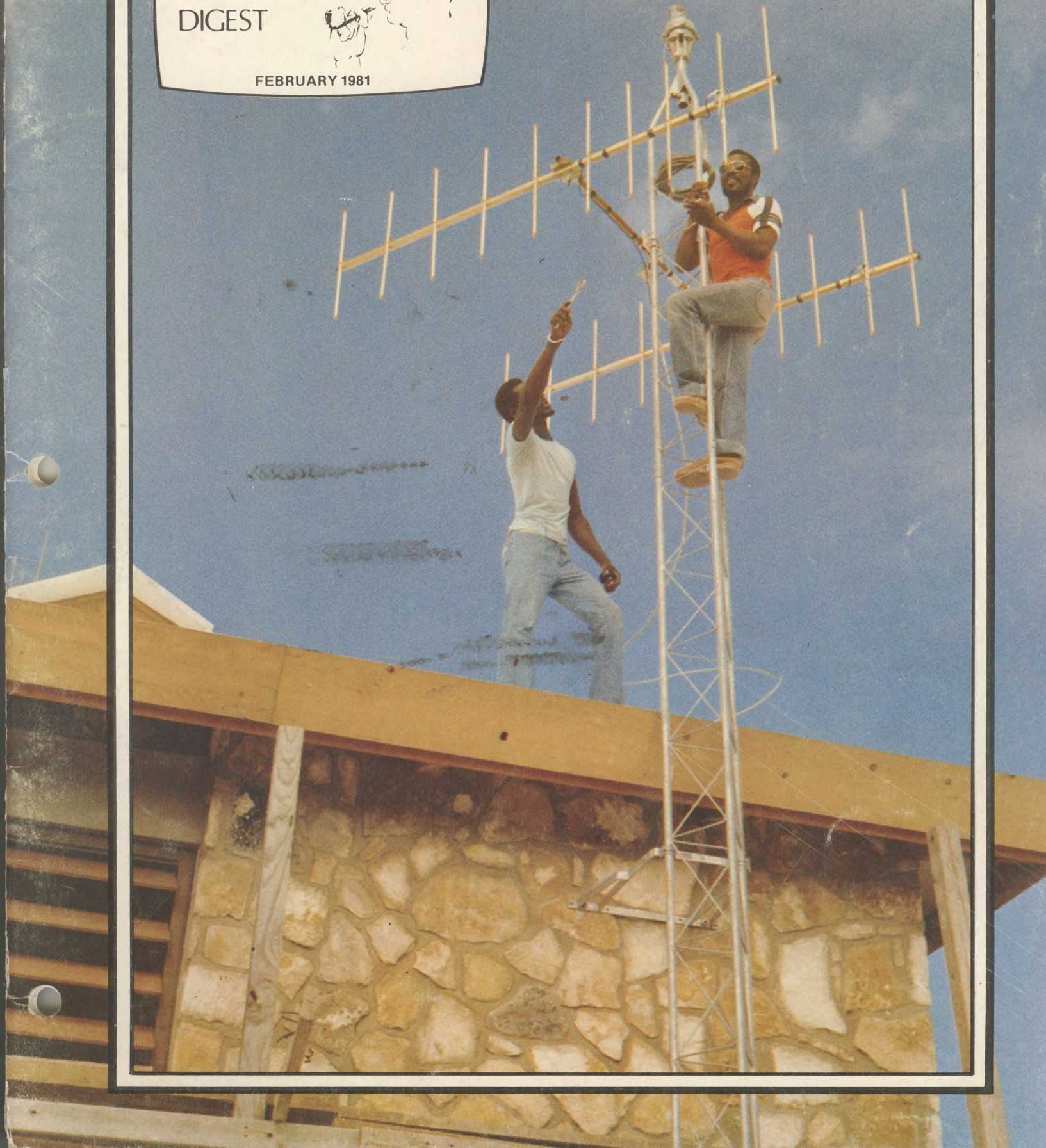
COOP'S SATELLITE DIGEST

FEBRUARY 1981



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COOP'S SATELLITE DIGEST T1-2/81

COOP'S COMMENT ON TECHNOLOGY

PREPARING FOR SPRING SPTS

The next Satellite Private Terminal Seminar will be held in **Washington, D.C.** over the Easter weekend; April 17, 18 and 19. The location is The Shoreham Hotel at 2500 Calvert St., N.W., pretty much in the heart of the District of Columbia. We are preparing ourselves for a turn out of 2,000 people.

A crowd of 2,000 (or 1,000 for that matter if we are 50% off in our estimates) is a substantial gathering. The mechanics of SPTS are starting to take on major proportions. Groups this size usually book their hotel facilities two or three years in advance. Three years ago this coming April only Tay Howard and I had operating private terminals. Neither Tay nor I had any notions about SPTS so we can be excused for not arranging for this spring's SPTS at that time.

We ran into the same problem last summer when we tried to locate an available facility for the California SPTS in July only months in advance. When we found the San Jose Hyatt facility we also found their only 'open period' was over the July 4th weekend. It was with some trepidation that we accepted the 'holiday dates' and we were hardly confident that people would want to spend their long weekend sitting in a lecture hall and crawling over and around parabolic antennas spread over a Japanese garden.

Because San Jose was SRO we approach the Easter weekend in Washington with less trepidation. On short notice there are simply not open dates in the DC area any other time this spring, so it becomes a matter of taking what you can get rather than calling the shots far in advance.

Although there was short notice to select a site and limited choice of sites available I am delighted with the Shoreham facility. This is one of those 'grand older hotels' built back in the days when marble floors and 30 foot ceilings were cost effective. A thirty million dollar renovation now underway will turn this hotel into a real showplace blending the grandeur of 'old' and the razzle-dazzle of 'new' into what may be the east coast's most complete mid-sized convention setting. The Easter Weekend has pluses and negatives. The famous National Cathedral which has non-denominational Easter Services in its gothic interior is around one mile away. This is 'Cherry Blossom' time in the capitol and Washingtonians agree that there is no better time to blend weather and surroundings for a vacation. The Cooper kids have never visited our nation's capitol and we'll spend an extra couple of days there doing just that.

Although we are calling this SPTS (our other choice is SBOC), the accent of this gathering is going to plainly be **business opportunities**. We'll return to a twin-session format with a mixture of business opportunity sessions and technology sessions spread over the three days, similar to last summer's San Jose gathering. Those interested in the pure technology of low-cost satellite reception and applying that technology on a **personal** basis will find our technical line-up awesome. This industry has developed an excellent selection of new technologists over the past year and you'll see and hear from many of these 'pioneers' in Washington.

The Shoreham has an operating MATV system so we'll load it up with no less than 30 hours of videotape from past SPTS/SBOC gatherings. The amount of 'file tape' on hand now is growing to significant proportions so we are busy editing tapes starting with the first SPTS in Oklahoma in 1979 to provide coherent backward-looks by topic matter at the foundations of the industry. In this way you can attend the Washington sessions in the daytime and attend the meaty portions of the past four meetings in the evening through the medium of your in-room television set. Yes, you are encouraged to bring your own VCR and tape the 30 hours plus to take home with you.

Because the satellite 'business' has become a significant activity, the business of getting into this business on a dealer/distributor level has taken on new importance. The success of Houston taught us that sharing the experience of those who are already there is not only very popular but much needed. I recall one chap who was simply staying at the Houston Adams-Mark on business when we took over the facility last November. He kept stumbling over satellite people, antennas and his in-room TV set's coverage of our busy-ness. By the middle of the first day he had been so over powered by it all that he cancelled the balance of his business trip, signed up for the seminar, and could be found sitting in the first row at all sessions. **He went home a dealer.**

Finally, while The Shoreham is roomy and spacious, there is one glitch in the location; suitable FI bird antenna locations are very limited. An announcement already mailed to past exhibitors notes this 'problem' and many of the antenna exhibitors are going to have to settle for WESTAR I and III, COMSTAR D2 and ANIK birds to show off what they can do. We are splitting up the exhibits into twin halls; one for those exhibitors **with** FI antenna locations, and then 'the rest'. Anyone planning to exhibit, who has not been with us before, be advised. FI antenna spaces are at a premium and may disappear even before the ink drys on this page.

So mark your calendar dates now for April 17-19 (virtually everyone will be coming in on the 16th) and plan to be in Washington for Easter. There is no nicer time of the year there and this year will be very special.

CSD TECHNOLOGY

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AN ANALYSIS OF THINGS TO COME

1981 TVRO DESIGN GOALS

As has been reported here in **CSD** from time to time back in the late 60's and early 70's when most of us were just trying to learn how to dial up a UHF channel on our television set a small group of advanced students at Stanford University was creating paper models of the television delivery system of the 80's. NASA funded a Stanford study of satellite video communications; a 'direct broadcasting' satellite system which would allow nations such as Brazil or India to cover all of their respective countries at one time with one clear, national service.

Several assumptions were made in the study. One of these called for the DBS birds to operate at 2.6 GHz (about 40% lower in frequency than our present 4 GHz band). Another called for the country benefiting from the satellite service to produce, internally, all of the receiving system hardware.

It turns out that the 2.6 GHz technology of 1970 is surprisingly close to the 4 GHz technology of 1981. In truth, if we take the completed Stanford study and jump a whole decade ahead to now, we can then go back and cross out 2.6 GHz where it appears and substitute 4 GHz with few other changes.

There was one assumption which we cannot accept however; the Stanford study called for one or at most two video channels of service from a single satellite whereas our present 4 GHz service offers upwards of 60 channels of video from perhaps a dozen satellites by the end of this year.

When the first private terminal hardware came into the marketplace towards the end of 1979 the so-called professional terminal manufacturers took one look at our hardware and laughed. They simply 'knew' that $2,000 price range receivers and $4,000 price range terminals were not going to satisfy anyone. Well, they were wrong. And they should have dug into their archives for a copy of Stanford/NASA study authored in 1970 or so. It reported in considerable detail how utilizing the proposed 2.6 (2) GHz band a single channel video terminal could be manufactured in 100,000 per annum (or 8,300 per month) quantities for $122 each! And that included $35 antenna cost and $87 electronics cost.

Of course these were **manufacturer costs** for raw parts and labor and they did **not** reflect any type of profit structure nor did they include any 'burden factor' for use of a manufacturing facility. Still, the numbers are instructive.

Nelson Ethier, in his STT Parabolic Antenna Manual, has shown us that it is entirely possible for a person to buy materials and then build in his own garage a 10 or even 12 foot 4 GHz contoured parabolic antenna (with frame mount and feed) for around $300/350. That's 1981 dollars by the way. And that is also utilizing parts bought at the hardware store in onesy-twosy quantities; no allowances for volume purchasing. Following the same formula presented in the Stanford study the same antenna produced in 100,000 per annum quantities would indeed cost under $100 to produce; parts and unburdened labor.

Avantek, Dexcel and Amplica have shown us that LNA prices are anything but frozen in the $1,000 price range. The Japanese have shown us that transistors that cost $300 each in small quantities can sell for under $1 each in large quantities. So in spite of protestations to the contrary, there is nothing really stopping the production of $50 LNA units except the volume marketplace required to absorb the product. In today's marketplace the price supports the volume; or vice versa. When the volume gets to 8,300 per month as it did in the Stanford study, the $50 (cost at OEM) LNA will be very close at hand.

Now when the Stanford study was done more than a decade ago it looked at the LNA plus receiver as integrated units; one was not separate from the other. Whether the married package installed at the antenna or inside was not material; the fact that both would operate **together** was. In fact the Stanford study, which backed up its paper model with real world working models just to 'prove' that the work being analyzed was not the creation of unrealistic academic types, looked at the full LNA+ receiver problem and determined that much of the receiver should be created on the circuit board itself. The mixer, bandpass filters and much more was to be etched or stamped into circuit boards or pieces of raw brass and copper. Where it then (and now) requires perhaps a dozen parts and several minutes time to assemble a 3.7 to 4.2 GHz input filter the Stanford 1970 era paper suggested stamping the whole filter into place in about the tenth of a second's time using around a half cent of raw metal stock.

As noted in Coop's Comment on Programming this issue, the mass production of high quality microwave video receivers may be headed for a shake-up. The present class of receivers largely depends upon research work done for receivers which were to be duplicated by hand, in small quantities. Yes, innovation in the production area by people such as Royden Freeland at ICM, John Ramsey at Sat-tec and David Barker for KLM have brought changes. But none today approach the type of mass production techniques envisioned back in 1970 by the Stanford research group.

With that background let's look at where we believe receiver innovation must be directed if the present relatively small home terminal industry is to survive the eventual appearance in the marketplace of industry giants with none of the bad habits of the present technologists.

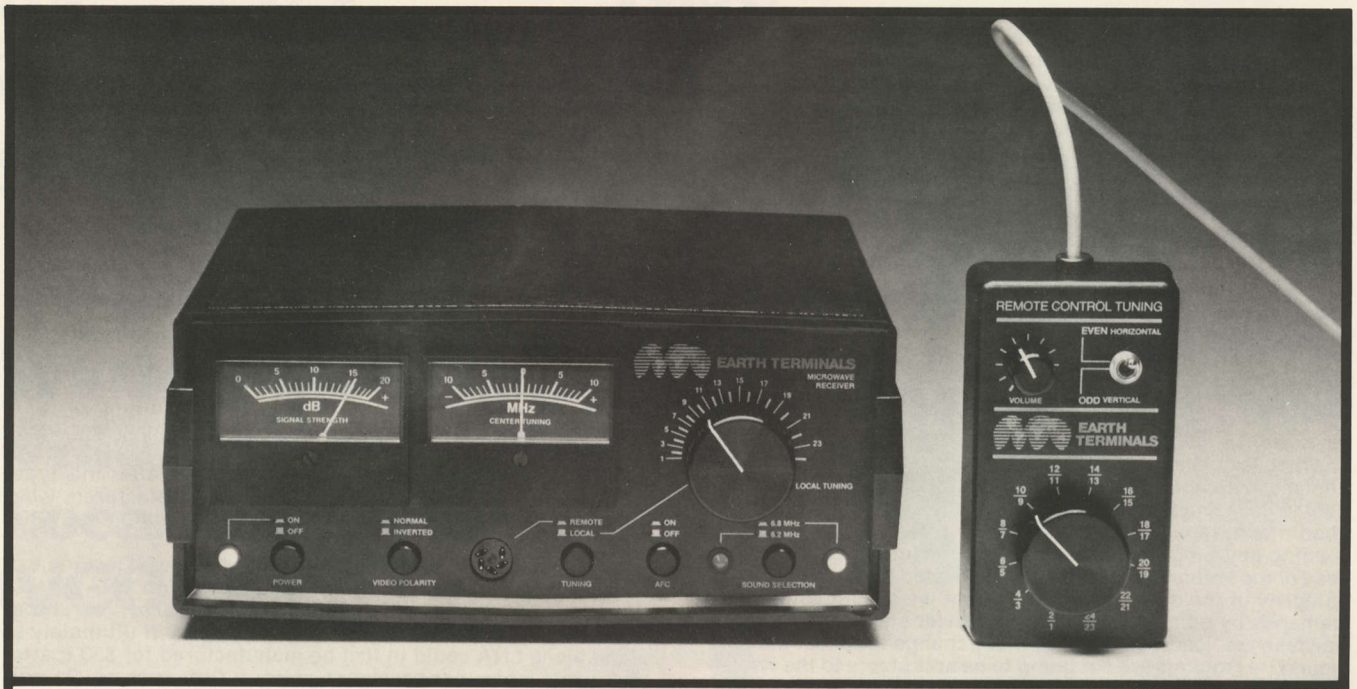
The Antenna

New technology in antenna system design must be directed at the packaging. Bob Luly's argument that dealers will not or cannot stock a half dozen (or more) 10 to 16 foot parabolic antennas is the key to success. Big, bulky antennas **are** an impediment to commerce. They consume unrealistic amounts of storage space, shipping space, manpower to move, manpower to assemble, and most of all they may cost as much to crate and ship as they cost to manufacture. **Something creative has to happen here.**

The obvious answer is to break the surface up into small pieces which can be shipped, etc. more economically and conveniently. Bob Taggart of Chaparral (and a part of the original Stanford study group) first recognized this problem in 1970. Bob Luly believes his Umbrella antenna simplifies the problem but there are some marketing challenges here. Luly is the first to warn that the antenna in an umbrella configuration requires some type of shelter to keep wind loading from buffeting the antenna. Any antenna that 'stutters' in the wind is going to create 'stuttering pictures'; they will fade in and out at a rate approximating the mechanical gyrations of the antenna movement in the wind. Placing the antenna inside of a lightweight enclosure may be an idea that can be sold to the public but it will take a very clever marketing person to put it across on a mass (as in consumer) basis.

Breaking the antenna surface up into small pieces creates new problems since the antenna surface achieves optimized gain or efficiency only when the tolerances are very tight (within + /- 1/16th of inch). That's why well made single piece or two piece antennas are preferable to well made 16 or 24 piece antennas; the odds are much better they will retain the required accuracy when assembled and installed.

Prodelin believes the answer lies with precision 'snap-together' segments constructed from tough, lightweight materials. Several firms are working on injection molding techniques marrying plastic (tough, lightweight) to metal (reflective) to create precision panel sections that are small



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enough to ship and precision enough to guarantee surface contour accuracy when assembled in the field.

We judge virtually all existing technology 'interim' in nature and suggest that anyone building antennas in today's conventional techniques has at most two years of 'life' left before mass produced, lightweight, precision, easily shipped antennas appear and then completely dominate the antenna marketplace. This will be an expensive technology to implement (one firm working on the snap together plastic approach estimates there are between $250,000 and $500,000 in 'molds' involved for a single antenna size) and that type of required investment will trim out the 'small boys' pretty quickly. If the marketplace continues to require multiple antenna sizes the mold investment alone will quickly amount to a million dollars or more.

Antenna mounts are another related problem. Large, heavy antennas require large, heavy mounts. If the antenna is to be motorized, that portion too must be large and heavy with considerable power to move the large structure accurately and precisely. Each reduction in antenna weight and bulk will make the mounting and motorization system more practical. Mounts that make a single contact with the mounting surface(ground or roof) will be much more acceptable at the mass-consumer level than mounts that require three or four points of contact. By loading up a single contact point with the full weight and wind load of the antenna new demands are placed on the mechanical integrity of the mount. At the moment we are meeting these demands by going to heavier and heavier steel members that can take the 'loading'. This too must change to reflect that 200 pound (+) mounts are not going to be acceptable to the typical consumer looking for a 'manageable' system. Anything in the system **the consumer** cannot lift or move will frighten the consumer. In the mind of the consumer the whole system has to present no obstacles. ''I can handle that'' (even if he never will) has to be built into **every part of the system.**

Motorizing the mount will be an absolute requirement; even if it is initially offered as an add-on optional extra. Consumer awareness of the multiple satellites each with their own distinctive services will increase rapidly. An antenna that cannot be moved easily will be at a definite dis-advantage in the marketplace. Most of the motorizing work done to date has been done by firms not building antennas. This has created marketing obstructions since few of the motorized systems can be adapted to **every** different type of antenna and mount. Frankly, the people who should be addressing motorized systems are the people who build the antennas. They cannot expect dealers to handle their antennas and then expect the dealers to sort out the problems of locating motorized mounting systems and dealing with a separate source for motorized gear. The first supplier to offer a completely motorized **line** of antennas (in the popular antenna sizes up to and including 16 foot diameter) will make a substantial dent in the present marketplace. Provided the system is a good one.

David MacZura's 'SatFinder' control system shown in Houston is a **step** in the right direction. MacZura has a consumer oriented mind and believes the consumer must be able to identify (at a non-technical level) with what it is the antenna system is doing. His system has 20 pre-programmable satellite locations (remember we have another six or more 4 GHz satellite positions open for North America and within a few years all will be filled) and a display system that indicates that the antenna is moving and where it is pointed. Using microprocessor circuits his keypad entry-control system looks much like a hand calculator; something the typical consumer can identify with.

Antenna technology is still in its infancy. Antenna systems of the future are not apt to offer more gain or work any better than today's versions. They are sure to be more conscious of the demands of a growing marketplace and will reflect greatly simplified ease of handling and assembly and use. Those are the challenges in the dish world.

The LNAs

Three years ago 120 degree LNAs sold for upwards of $2500 and the semi-prescious low noise GaAs-FET transistors (two or three per unit typically) sold to the LNA manufacturer for as much as $350. Worse yet, they were in such short supply that in a 'good month' no more than 250 such devices were available to all of the industry (!). All of this has changed so that today GaAs-FET technology is itself approaching maturity and at the LNA manufacturer individual GaAs-FET costs are well under $25. And they will go lower; perhaps down to the $10 region within a year. Now that GaAs-FET suppliers know how to turn out the little transistors in quantity the big hurdle is past.

And because it is past the LNA suppliers have been turning their attentions to other portions of the marketplace. Everyone has dreamed of a microwave integrated front end; that is, **a combination LNA plus receiver** all constructed at one time using essentially the same technologies and sharing the same container. Yes, the container would mount 'outside' at the antenna proper. At least two US LNA manufacturers are into prototype front ends at this point; combination LNA (gain at 4 GHz) stages followed by downconversion to a high IF such as 1200 MHz. This is exciting technology but it is not consumer technology; at least not at this stage. Firms working on this approach are Dexcel and Avantek. Both are known for their microwave innovation but not their complete-product consumer orientation. Initially at least both will **offer** this type of semi-integrated technology **to** receiver manufacturers who will then turn the microwave sub-systems into complete TVRO receivers.

At this stage Dexcel and Avantek appear to be looking for a bigger piece of the receive system 'pie'. With LNA prices dropping, one way to hold up their 'share of market' or 'share of system price' is to build more of the system. If ultimately a stand alone LNA could in fact be manufactured for $50 (parts and direct labor; not consumer price) a firm such as Dexcel sees their eventual volume of units growing but their gross sales standing still or even declining. One way to 'correct' that before it happens is to expand their 'share' or portion of the receive system; adding for example the downconversion stage from 4 GHz to the high IF to begin with and perhaps adding a second conversion (down to 70 MHz) in a later step.

In this scenario they are not building complete receivers. They may **never** build complete receivers. It is traditional for microwave technology companies to supply microwave parts to other firms that make the **complete** product. The LNA is an exception to this rule simply because everything about it is microwave technology and it does not integrate directly with other parts (in the **present-today**-scheme of things).

If Dexcel or Avantek will not (in the near future) build complete TVRO receivers, how might their expanded technology (LNA plus downconverter) be seen in the marketplace? They will go to existing or new receiver manufacturers and sell them on using these 'front end' segments. Around these segments the receiver manufacturer will create the balance of the receiver system adding the final IF sections, tuning, demodulator(s), audio sub-carrier processing and detection and the bells and whistles of 'innovation'. It is likely that several different consumer receivers may evolve at several different manufacturers; **each using the same front end** as supplied by Dexcel, Avantek or some other 'high technology' firm.

As innovative as this sounds, it is still a long ways from the Stanford 'ideal' receiver designed in 1970. For in that system all of the LNA plus receiver were to be manufactured at **one place**, at **one time**, using and re-using the same sub-system parts over and over again to avoid costly duplication of parts. The problem here is quite basic. The people who know and understand **microwave** technology (i.e. Dexcel or Avantek in our example) are **not the same people** who (1) know and understand IF and demodulation schemes, and perhaps of greater importance, (2) know and understand the mass production and marketing of consumer products. Knowledge of IFs and demodulation schemes can be learned or 'bought' quite easily. But adapting froma high technology marketplace where engineers only talk to engineers (the present world of microwaves) to a world where engineers must out of necessity talk with totally non-technical buyers is another major step. It cuts into the very philosophy and foundation of running a high technology firm.

Assimilating knowledge to produce IFs and demodulators is technical. Assimilating the ability to deal in non-technical terms with non-technical buyers is philosophical. It is a far

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V812	0.9-1.6	0 to 60
V813	0.9-0.95	0 to 20
V814	2.7-3.2	0 to 20
V815	2.7-3.7	0 to 60
V818	2.8-3.4	0 to 18
V907	3.6-4.2	0 to 15
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"Coop's Satellite Digest" of July 1980 says that Watkins-Johnson's VCO's have a lower set of FM sideband noise figures than the competitor's published specifications (FM sideband noise is unwanted noise that comes out of the oscillator and can, in severe cases, degrade the performance of the receiver noise figure). In addition to good FM noise performance, delivery is also good. One example is SATEC's experience in getting an adequate supply of the "hard to procure" high LO.

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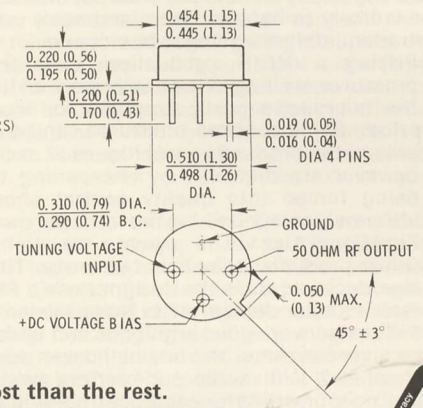

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tougher hurdle for a high technology company than you might imagine.

The real challenge of the LNA/front end area is more management than technical at the present time. If the firms with the LNA technology continue to address the marketplace in the traditional 'microwave segment packaging' manner there will be something of a Mexican standoff. **They have** the key to the really precision technology required but not the intuition or inclination to finish the product by building a complete unit. Other firms, lacking that precision technology, have the inclination to do a complete job **but lack** the resources to do a complete job. This leaves the LNA plus receiver combo in a state of interim packaging; one group of firms builds the exotic parts while another group buys these exotic parts from them and completes the packaging and then does the marketing.

As long as this situation endures the 1970 era Stanford-Fantasy receiver **will not** come into the marketplace. The challenge here is to put together a company that has both disciplines under one roof and following one set of corporate guidelines. It is not an easy challenge.

The Receivers

Having identified that the best marriage of a consumer receiver will include an LNA as an integral part of the unit, one might suspect that little could be said separately about the receiver proper. However, having further identified that management and philosophical hurdles remain before such an ideal receiver approach can fly into the marketplace this suggests that we will have 'interim technology' between where we presently are and where we expect receive systems to be in the future.

Steve Birkill is right(see Coop'sComment on Programming this issue). Receiver innovative needs a shot in the arm. The problem is really in three areas.

1)**Quality** - As the marketplace becomes more and more consumer oriented and the national dealer network grows by leaps and bounds the technical base for the people practicing the art becomes thinner and thinner. This says that when something does not work properly, when it comes out of the factory shipping container, there is less and less liklihood that the persons who unpacks the product is qualified or capable of even diagnosing the fault much less capable of fixing it.

Yet the present basic receiver design **begs individual attention** to each receiver at the manufacturing level if the receiver is to perform to standard specifications in the field. But with production quantities increasing (both Sat-tec and KLM are frightfully close to 500 units per month now) the exact reverse is likely to happen; more and more units that do not perform adequately are going to be shipped.

2)**Pricing** - With production quantities increasing pressures starting at the dealer work all the way down to the microwave parts suppliers for lower and lower prices. Some of these pressures can be met with more automated production techniques at each level. Others however are met only by cheapening the product or being forced into quality **control** short cuts which ultimately compound the first criteria; quality.

3)**Functional Use** - The primary variations between receiver products today is in two areas. The first is a design decision; does the designer use a PLL demod or a discriminator demod. After that decision the balance of the design work goes into 'bells and whistles'. Will the receiver have one, two or a half dozen audio sub-carrier channels? Will audio sub-carriers be tuned in fixed positions or with a tuneable control? Will the unit have a hand held remote control? If yes, what will the control do?

Unfortunately little real innovative-attention has been paid to the ultimate variety of uses for the receiver proper. Let's look at a **few** of the 'problems' now present in marketing which could be addressed by receiver designers.

Multiple outlets - The simplest way of sharing the TVRO service is to extend the RF output (typically on channel 3 or 4) through some low-cost coaxial cable (RG-59 or RG-11) from the TVRO receiver proper to as many receivers as need to be connected to the system. Unfortunately this restraicts the viewers on the 'system' to the program channel selected by the master control. Everyone watches CBN at the same time.

The typical TVRO receiver 'modulator' is very low powered; a result of utilizing low-cost TV game or VCR modulators inside (or outside) of the TVRO receivers. Output on channel 3 or 4 is often no more than 2-3,000 microvolts and it take around 1,000 microvolts to insure a good quality picture to a **single** TV receiver. After you connect up a pair or three TV receivers (at most) you have a 'level' problem which can only be solved by tacking on an add-on RF amplifier in the coaxial cable system. **TCI** offers a much higher RF output level in their TVRO receiver (capable of driving several thousand feet of cable and feeding perhaps 200 + TV receivers). This may be overkill but there is a message here. The standard modulator with 2-3,000 microvolt output is simply not enough to handle a modest in-house wiring job properly while the TCI approach is a bit too hefty. What is really needed is an in-between level, in the 10,000 microvolt region, so that the system installer can drive a half dozen to ten receivers through appropriate low-cost cable and line splitters/taps. To increase the capabilities of the modulator is as simple as adding a single stage transistor RF amplifier (at channel 3 or 4) after the present low-power modulator.

This is a simple 'improvement' that would help many installers do their jobs more effectively, with less hassle of chasing outside parts and units. But it is still not the right overall answer for multiple outlet viewing.

The presumption that each viewing location will be satisfied to watch the **same program** at the same time is a dangerous one. The present alternative (buy two receivers) is not cost effective. One possible answer can be found in the new Dexcel / Avantek front ends. If the 4 GHz satellite signals were converted to a high IF (such as 1200 MHz) then the output of that unit (LNA plus first downconversion) could be individually accessed by two or more separate receiver demodulators. Unfortunately for each demodulator location to have independent access to the **plurality** of satellite signals available the entire 3.7 to 4.2 GHz band of signals must be 'block' converted to a high IF. In the 'professional' field Hughes does this with a receiver design pioneered originally by private terminal receiver designer Steve Richey (see **CSD** for June 1980).

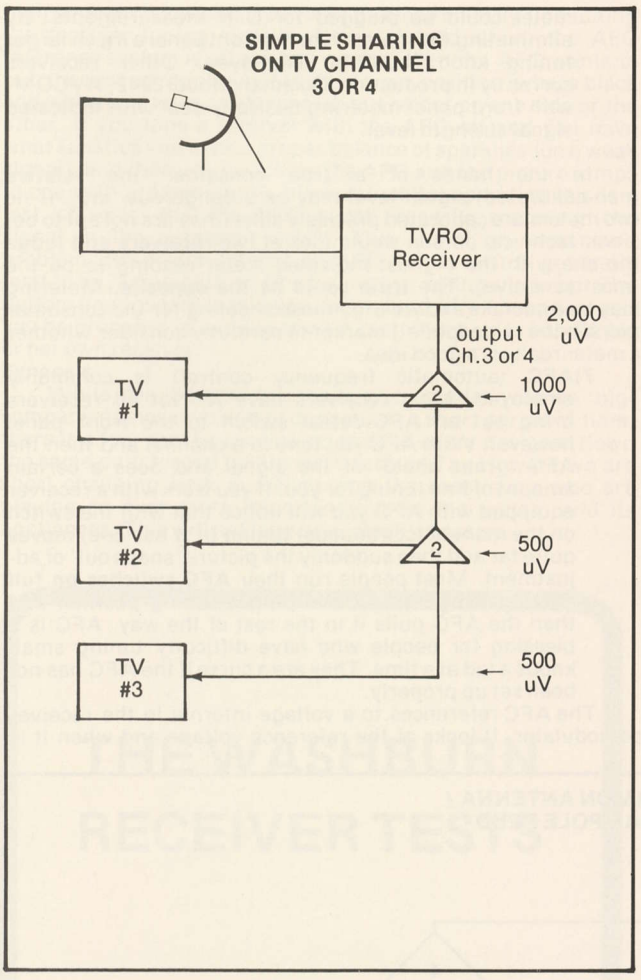
If the full 'block' of channels were downconverted to say 500-1000 MHz, they could in turn be transported around to multiple homes-receiver locations in that 500-1000 MHz range by using relatively low-cost coaxial cable and where required booster amplifiers. Then each home demodulator terminal would take the 500-1000 MHz 'block' of channels and tune them in one at a time with a tuning unit that covers the same 500-1000 MHz range.

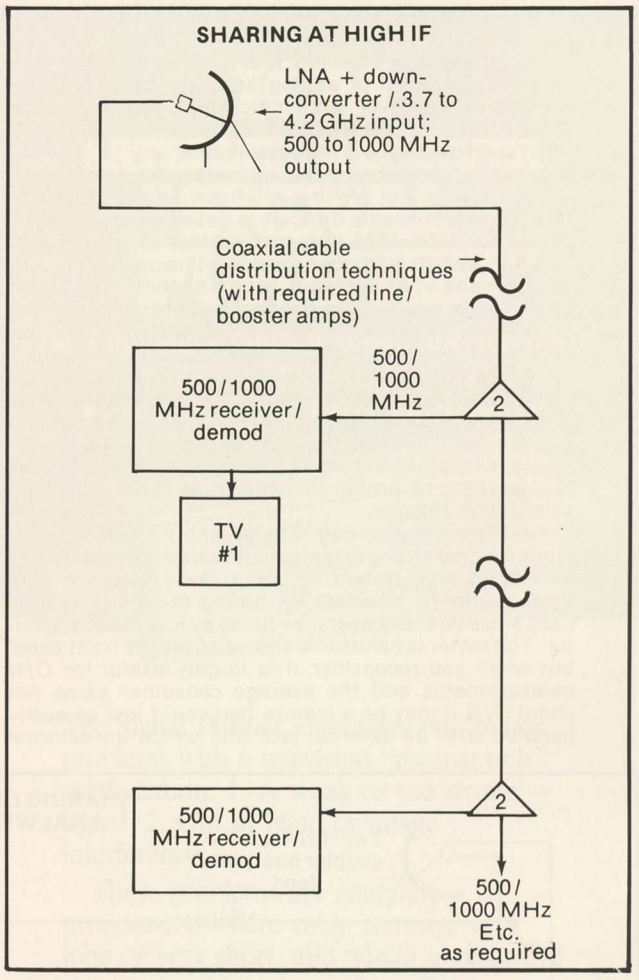
Such an approach was under active study at **H & R more** than a year ago. It offers some advantages and disadvantages. The advantages are that it is far less expensive to transport the same block at 3.7 to 4.2 GHz. Getting the signals away from the microwave spectrum and into the UHF spectrum **is** cost efficient. However there is an even more efficient way of doing it; transport the signals at VHF channel 3 or 4.

In terms of real numbers, it can cost as much as **$2.50 a foot** to transport signals at **4 GHz**. At **500-1000 MHz** the cost per foot of transportation drops to around **$.25** (for cable and electronics). But at **60-80 MHz** (VHF channels 3 and 4) it costs closer to **$.025 per foot**.

H & R determined that the most cost-effective and flexible system would place a **full** receiver for **each** location at the antenna site. The individual homes would have simple remote control (which could be carried from the home to the receiver location at the antenna site 'backwards' through the low-cost coaxial cable) over their own reciever. It would even be possible to give each independent home access to both vertical and horizontal polarized signals through remote switching.

The cost effectiveness of shared systems becomes more important when one begins to market terminals into areas where several homes can be served with a single TVRO antenna and LNA package. There is a further advantage when one also considers the esthetic values of a neighborhood and the possible dissent that might arise when parabolic antennas





begin popping up in **multiple backyards**.

From the marketing point of view such an equipment approach would offer 'step-up' possibilities. For "$X" two neighbors could have a shared terminal in which both watch the **same** program at the **same** time (simple series connection of the second home to the first home at VHF channel 3 or 4). For "$1.5X' the two homes could have **independent access** to all of the signals on the bird the antenna is pointed at. For perhaps '$2X' four homes could have independent access to all fo the signals on the bird.

The hardware to do this could be patched together **today** from existing bits and pieces. But a specific receiving system, designed to do this and designed to be cost effective while doing this does not exist. There is a challenge here if there is sufficient marketing interest for shared systems.

In another area 'patching together' is the rule rather than the exception. And there is a challenge here also. Many of the present level buyers have a reasonably full compliment of video systems equipment already in their homes when they add the TVRO system. They want the TVRO system to mold into their present system with a minimum of patch cords and makeshift connections. Virtually none of the receivers now on the market address this aspect of consumer convenience. For example:

1)A **consumer oriented receiver** should have both RF (channel 3 or 4 selectable in the 10,000 microwave region) and video/audio outputs. The video should be 1 volt peak to peak (that's pretty standard although several that **think** they have this are likely to be closer to .5 volt p-t-p in the real world). If the receiver does not have a built-in modulator there should be a **pair of video and audio outputs**; one to drive an external modulator and one to drive a VCR deck. Audio outputs should be in the 150 to 600 ohm range to drive either VCR audio decks or balanced inputs to external modulators.

2)**Taylor Howard's concept** of an internal audio system in the receiver is basically good but we think an earphone jack rather than a dedicated speaker built into the TVRO receiver makes more sense. Creating cabinet space for a built-in speaker plus having sufficient audio (2 watts or so) to drive a speaker seems needless when what you really want is a way to plug in and listen to the audio at the antenna proper when you are doing initial set up of the system. You can't always have a video monitor at the antenna. You can carry a pair of earphones in your tool box.

3)LNA powering from the receiver is now pretty standard. It doesn't go far enough. Power (current) drain of the LNA is an important **monitoring point** for potential LNA problems. One simple solution is to place a closed circuit jack on the rear panel of the receiver adjacent to the LNA power plug. By plugging a milliamp meter into the jack an installer or technician could quickly check the current being drawn by the LNA to insure that the LNA was getting power and that the current being drawn is the proper amount for a functioning LNA. Anyone who has spent time trying to determine if an LNA is getting voltage (and therefore drawing current) will appreciate this small addition.

4)Most professional receivers have a 70 MHz IF output jack. If you have such a jack you can plug into it with a CATV/MATV field strength meter or a low cost spectrum analyzer or even a wideband scope with detector. Then you have a quick way to see exactly what the 70 MHz IF waveform looks like (scope or spectrum analyzer) or what the signal level is (FSM, scope of ana-

lyzer). If the receiver also has a switch to dis-able (as in turn off) the AGC (automatic gain control) you now have an excellent way of doing precise antenna alignment peaking. The cost of adding an F fitting on the rear apron of the receiver, back matched at 75 ohms, is very small. The convenience for those who install and maintain receive systems is immeasureable.

5) **The tuning control** on most recievers is tiny; too tiny for a comfortable feel. With a relatively small front panel space it is admittedly difficult to get a larger knob onto the front plate. ICM gets around this by having a 12 position switch and then backing this up with a fine tuning knob. The 'vernier' action of their fine tuning knob 'feels good'. The Sat-tec receiver is like many others continuously tuned and for people not accustomed to tuning in electronic equipment **it is difficult to tune**. The Washburn receiver uses both approaches; the on-demodulator knob is small and continuously tuned but the more frequently employed remote control is 12 position switch tuned. Anything that is difficult for the typical consumer to tune is a mistake and small knobs that you have to 'breath on' to fine tune to perfection are a detriment to sales.

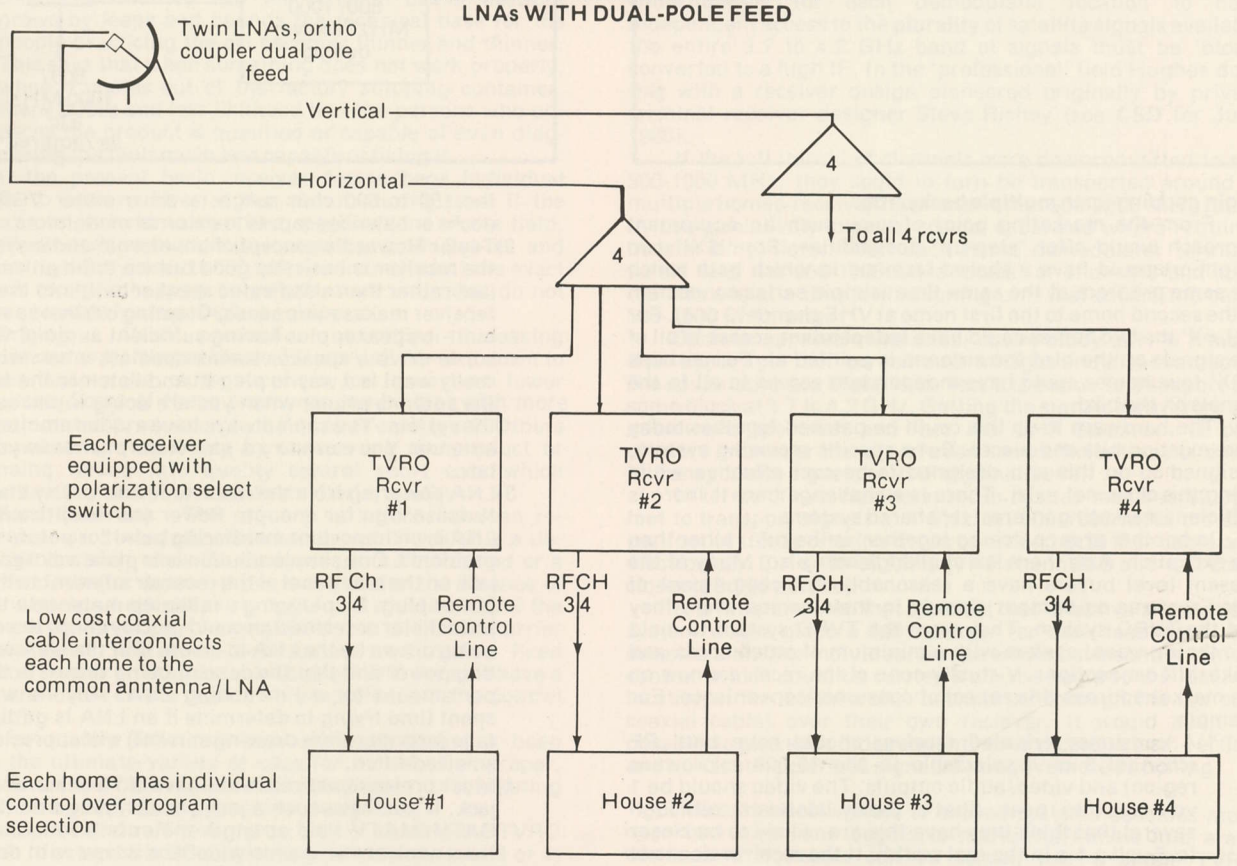
6) Metering is a mixed bag. The Washburn receiver provides a signal strength meter (with calibration pot) and a well explained system of doing fairly accurate C/N measurements. However for tuning the meter is little used since virtually everyone tunes by looking at a monitor. The meter is handsome and balances the front panel but when you reconsider it is largely useful for C/N measurements and the average consumer cares not about C/N it may be a feature that could just as easily handled with an external jack into which an external meter could be plugged for C/N measurements. By eliminating the meter from the front panel a much larger tuning knob could be employed. Other receivers currently in production (Coleman Model 3742, AVCOM) with front panel metering basically deal with **indicated** signal strength level.

In the hands of a true consumer the relative (non-calibrated) signal level may be a dangerous 'toy'. If no two meters are calibrated precisely alike (they are not apt to be) a non-technical person would look at two receivers and judge the one with the highest indicated meter reading to be the 'most sensitive'. **The truth could be the opposite.** Metering may be a mistake and we urge those shooting for the consumer (versus the 'videophile') market to carefully consider whether a meter really is a good idea.

7) **AFC** (automatic frequency control) is commonly employed. Most receivers have it. Not all receivers bring out an AFC-defeat switch to the front panel however. With AFC you tune in a channel and then the AFC 'grabs ahold' of the signal and does a certain amount of fine tuning for you. If you work with a receiver equipped with AFC you will notice that with the switch on the manual (continuous) tuning (if it has one) moves quite far and then suddenly the picture 'snaps out' of adjustment. Most people run their **AFC switches on** full time, getting close to the proper tuning position and then the AFC pulls it in the rest of the way. AFC is a blessing for people who have difficulty tuning small knobs a tad at a time. They are a curse if the AFC has not been set up properly.

The AFC references to a voltage internal in the receiver demodulator. It looks at the reference voltage and when it is

SHARING OF COMMON ANTENNA / LNAs WITH DUAL-POLE FEED



high it moves it low and vice versa by electronically fine tuning the receiver tuning circuits. Now - if (and when) the AFC reference system is off for any reason, then the AFC wants to pull the receiver tuning not to the proper position (where black and white sparklies are **balanced**) but rather on one side or the other. If you tune a receiver with the AFC off and you have what satisfies you to be a proper balance of sparklies (on a weak signal), and then you switch on the AFC and the picture jumps to one with predominently black (or white) sparklies this is a test (of sorts) that the AFC is not properly 'centering' the signal in the automatic mode. This is not an uncommon problem. Receivers without an AFC defeat switch generally tend to be 'adjustable' in fine tuning by rocking the knob. The bottom line concern is that **you understand why** it happens, and you be prepared to explain to your customer how to handle his or her own receiver.

Synopsis

While this industry has made giant strides with no 'big' company names involved to date in just a short period of time, there is a fear that by continuing to send every designer down the same path forged by pioneers such as Tay Howard we are short changing both ourselves and the consumers who are playing an ever more important role in the system and its appliances. This will not long be a 'small' industry....

THE WASHBURN RECEIVER TESTS

A VERY INTERESTING RECEIVER

We last saw Clyde Washburn at the Houston Emery airfreight office. Clyde was packing up some materials to return to Fairport and we were shipping goodies onto a clandestine address in Florida for re-shipment to Provo.

"**Your receiver is in this box**" we said to Clyde indicating a box headed for Florida "**and I cannot wait to get it to Provo and try it out**". Clyde smiled. "**I remember a girl in high school**" he recounted "**who I always wanted to date. When I finally did, she turned out to be a big disappointment**".

Expectations. Just over one year ago STT brought out the Washburn Receiver Manual. It was our first experience with Manuals priced over $30 and it was our first 'typeset' and elaborately produced 'fold-out-pages' Manual. It cost us a bundle; our draftsman still asks when we are going to do another 'Manual like Washburn' since he got rich drawing all of those fancy schematics.

The Washburn Manual sold very well at first. The high technology types largely appreciated Clyde's frank and honest approach to circuits and the 'Super PLL' demod led to many high level arguments. Then there was Miami. Clyde was there with his receiver. The appearance was almost identical to serial number 84 we have here on Provo now. Only when Clyde tried to make it fly in Miami at SPTS a year ago it didn't; fly or anything else. I have this set of photos, shot with a telephoto lens from afar, of Clyde crunched down in the Ramsey Electronics booth trying to figure out what was wrong. Channel four in Miami, a very strong off-air TV signal, was the problem. It was getting into the receiver's IF string and Clyde, coming from Rochester where they don't have a local channel 4, was

trying to get rid of the annoying local TV signal.

Well, Clyde is no cry baby. He went back to Rochester to find the cure. And he lost time; valuable time. He found several other things he wanted to change, and since he was well into the receiver at this point he decided to update where possible. Meanwhile John Ramsey, the authorized builder and distributor for the product, was getting nervous. John had taken orders in Miami for the unit. Some people felt it looked too good to pass up, even if they only saw it in Clyde's lap upside down there. Ramsey felt this pressure and he passed some of it on to Clyde. Who took it straight up; he wasn't going to "release the receiver to production until he was satisfied there were no more bugs in it". This friction eventually led to the dissolution of the Ramsey-Washburn (or Washburn-Ramsey since we play no favorites) relationship. And that left Clyde, as of 1 July, with a mature receiver but nobody to produce it.

We would like to tell you who stepped in to fill the Ramsey production role; but we promised Clyde we wouldn't put it in print. Suffice to say that 'Microwave' is in their name (that ought to narrow it down to a few dozen) and they have a bunch of very good products; but not in the TVRO field.

I remember Clyde calling one day to tell me about the analysis performed on his receiver by the Harris Corporation; a firm that builds everything from gigantic satellite dishes and very sharp receivers to a line of broadcast transmitters. Harris got their hands on a Washburn receiver because they put some pressure on Clyde. The tests were revealing. Harris put the Washburn receiver, with the 'Super PLL demod', up against every other receiver they had. Including their own (which they advertise as having a 7 dB "threshold"). Harris told Clyde, perhaps reluctantly, that the Washburn receiver, after detailed analysis, was every bit as good as their own "7 dB threshold" commercial receiver. And both were better under low signal level conditions than any other (commercial grade) receiver they tested. I told Clyde I wouldn't tell anybody this but he no longer works for Harris (that's how they pressured him) so I figure all bets are off now. I like the story since I can just see GM testing a T-Bird and admitting that it is every bit as good as their Cadillac. That took some guts on the part of Harris.

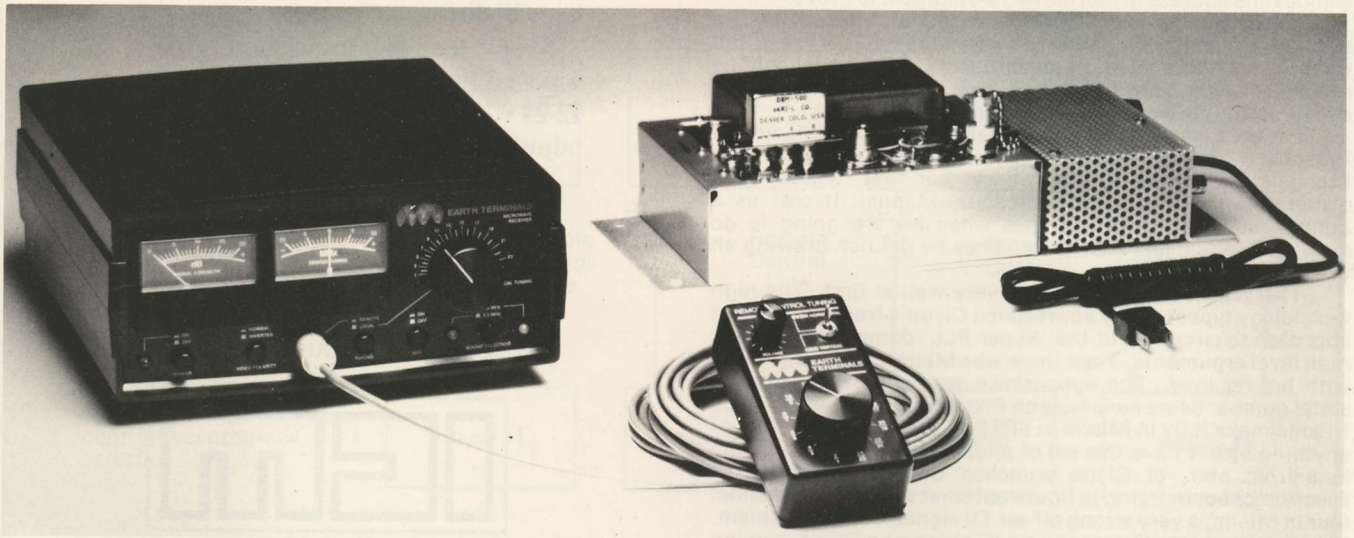
So two weeks after I left Clyde at the Houston Emery office my Washburn receiver finally arrived on Provo. Ten minutes later I was tuning in WI with it. Hang on - I'll tell you my impressions and test results shortly.

The Washburn package should be no mystery to anyone who really cares. The STT Manual of the same name details the receiver very nicely. I have two regrets about the Manual. That Clyde no longer offers the receiver in kit form (although I support his decision not to offer it as a kit anymore because as Clyde says "**the wrong people were trying to build a kit and for the wrong reasons...**"), and that Clyde does not pack the Manual in with each wired and tested receiver shipped. Gawd, we have a bunch of those Manuals left! Anyhow, if you are a sharp technical person and you want to see how Clyde designs a receiver that Harris admits rivals the best of the commercial units, well, Washburn Manuals are "still in stock". (That probably sounds frightfully like a plug for the Manual; it is not, but to boil down 50 pages of schematics and diagrams and photos to a few paragraphs is no easy chore.)

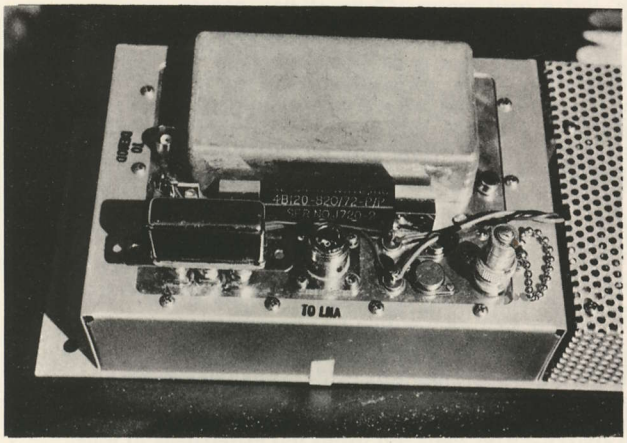
The Washburn Receiver is sold by Earth Terminals (Inc.), P. O. Box 636, Fairport, New York 14450. Their telephone is 716-223-7457. Clyde usually answers the phone himself. Now what you have here is a three piece package. Or more with options. The 'basic' package consists of a 4 GHz to 70 MHz downconverter, a demodulator, and a remote control package that allows you to change channels and move the antenna polarization (with an optional feed rotation package) at a flip of a switch. With options you can (as noted) cause your feed antenna to rotate from vertical to horizontal to vertical (etc.) through all 24 channels if that pleases you; it makes more sense to rip through **one** polarization, switch the antenna to the opposite pole and then rip back down again however , add 220 VAC operation, go for PAL or SECAM de-emphasis (in case you are so located where NTSC is not available from 'your' bird), add special audio sub-carriers (6.2 and 6.8 are standard), add a DC block to power your LNA through the downline coax and add an image reject filter for those (older) LNAs which don't have adequate low end roll off of noise.

The downconverter is designed to be installed at some convenient, weather proof location; such as in your attic or some place away from the demodulator proper. You can put it up to 360 feet of RG-8U foam cable away to connect the 70 MHz IF output from the downconverter to the demod. We ran ours about ten feet apart hanging the downconverter on the inside of an equipment rack along with the rest of the 4 GHz receivers. The downconverter has to have its own 117 (nominal) AC outlet; you plug your downline into it and through a BNC connector run line (at 70 MHz) to the demodulator.

The demodulator is the fancy box you see here; the one with the two meters on it. Now 70 MHz goes into the demodulator and video and audio comes out. The demod also has to be plugged into a handy 117 VAC outlet. On the front panel you have a two position (in and out) switch that determines which of the two audio subcarriers your receiver is equipped with has "priority". That means that if you tune to a video channel and there are **two** audio or otherwise modulated subs present the button position determines which (6.2 or 6.8 standard) has 'priority'. In either position it looks for audio anyhow and if only one of the two is occupied, it stops there.



THE COMPLETE PACKAGE



Also on the front panel is a manual tuning knob (to tune continuously from transponder 1 to 24), an AFC (on and off) switch, and a video polarity switch. Some of the not very sophisticated services attempt to 'scramble' (their word; not mine) their video by merely reversing the video polarity. Clyde let's you descramble this elementary 'scrambling' by pushing the front panel button.

There are two large meters on the front panel. They dominate the appearance and until we actually worked with the receiver we were not sure how useful they would be. The left hand meter indicates signal strength and a shaft on the back of the receiver lets you adjust this meter to scale so a high gain LNA or noisy LNA doesn't drive it off scale to the right. The right hand meter is a center tune meter. Anyone who understands how FM (video) works will appreciate the difference between having and not having this meter. If you tune in your satellite video signals by eye now trying to balance the black and white sparklies (I just **assume** everyone has sparklies on **some** transponders!) the right hand meter takes the eye-balling tuning out of the game. You tune until the meter is 'centered' in mid-meter-face and that's where the sparklies are balanced. Whether your eye agrees or not.

Then there is the hand held remote control portion. Clyde supplies it with 25 feet of cable; you can extend it if you follow his directions. With it in your hand you can change transponders and switch polarization of the LNA if it is equipped with his remote switching feed rotation option. It can do one more thing as well.

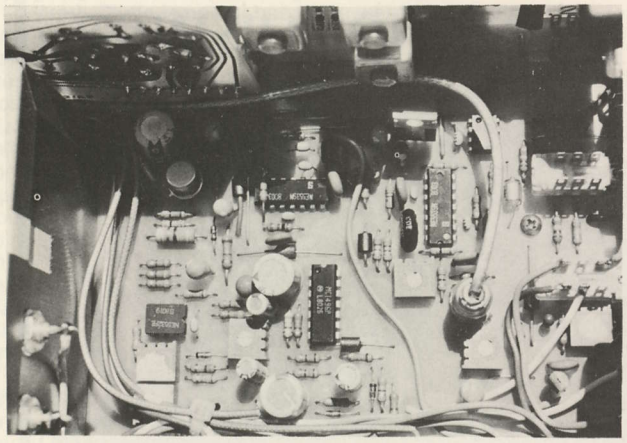
On the back apron are RCA jacks for video (1 volt peak to peak) and two audio outputs. I assume Clyde is an audiophile. Because one of the jacks has 0 to 1.5 volts RMS hi-fidelity audio coming out if to connect to your in-home stereo system. Back on the remote control you have a volume control which operates on the hi-fi output only. When the phone rings you can turn the audio down without leaving the easy chair, in this mode. The volume control on the remote does not function through the regular audio output jack (-20 dBm at 600 ohms) however.

Now my impressions and test results. Unlike Clyde I was not disappointed with my 'big date'. Quite the contrary, the receiver does everything I hoped it would and perhaps more. But that is a sweeping statement that begs more attention.

Until I plugged in the Washburn receiver, the best performing, most sensitive receiver down here in the Turks and Caicos has been the ICM 4300 we wrote about last fall. The Washburn receiver is its equal, in **sensitivity**. That word is in bold face print because it is pivotal to what follows.

There are two factors to be considered with any marginal (i.e. small terminal) installation; one is receiver sensitivity and the other is receiver video performance. The ICM 4300 and the Washburn are so close in sensitivity that you can (with a baseband signal to noise analysis test set) find either one in the lead by .1 to .3 dB over the 24 channels of FI. A dead heat.

Now to video performance. When we activated our 16 foot dish to feed FI programs to the Turks and Caicos we put the



CLEAN BOARD CONSTRUCTION and layout shows Clyde has done things like this before.

Washburn into main-duty service and the ICM 4300 into backup service. Why? Well, while the **sensitivity** of either is virtually identical the **quality** of the video coming out of the Washburn is substantially better. If you feed a color bar pattern into the two receivers and then compare the output on a video waveform monitor you quickly see that the Washburn meets commercial standards. The ICM does not.

Now this is not to say that the ICM video looks all that bad; but a side by side comparison with the Washburn is a paling test. The color edges are sharp and well defined. They don't wander or jitter and the colors are almost smear proof. **Almost** means we have seen slightly crisper pictures but not in a receiver that exhibits this type of sensitivity. Some of the Washburn promotional literature suggests you can have the 'best of both worlds'; good threshold sensitivity and excellent video image reproduction. Believe it.

The audio. It is very good. We initially found that it was low for our particular application but digging into the Washburn Manual we found an explanation of this and ten seconds later we had tweeked on R59, an audio output pot and set the level to the amount we needed. Clyde's interest in good audio shows; even the standard (non-hi-fi) output has audio bandwidth which some of the FI transponders (21 in particular) cannot or do not use.

This is a lot of receiver. A close inspection to the innards reveals that it is built to very professional standards; the boards are exceptionally clean, well laid-out and while we have had no difficulties with our unit and anticipate none we suspect trouble shooting would be a breeze. Especially if you had a Washburn Manual; heh-heh.

The center-tune meter has been explained. We like it but honestly wonder about taking up 25% of the front panel with a meter that tells you you are on frequency. The signal level meter is a rather clever gadget that is probably **too good** for the average home user although we suspect any technical type would play with it by the hour. We did.

Clyde has the meter magnificently 'damped' so that you can use the meter to peak your antenna on the bird.We plugged a video signal to noise measurement test set into the output and then moved our 16 footer off the bird. Then we went back and watched both meters (the video SNR and the Washburn field strength meter)carefully.Clyde's receiver data sheet lets you read signal level from the meter and then compute (simple math) the CNR (carrier to noise ratio). We did this and could tell 0.25 dB video signal to noise changes as we moved the dish on the Washburn receiver field strength meter. That's pretty decent. In fact after cross checking the field strength meter we never looked at the complicated video signal to noise test set instrumentation again. When you can read .25 dB changes in video SNR with a CNR meter you have the world by the tail for antenna pointing.

This is a tune for max meter and perhaps if you re-sell TVRO hardware that's all you need to tell your customer-user. But the truth is that since you can measure CNR changes and do noise floor reference measurements you can compute (again, simply) the apparent CNR in the process. Very nifty and it sure beats hauling around a video SNR test set or a 4 GHz spectrum analyzer to compare various transponder to transponder signal level differences. The final proof of the pudding was that with the field strength meter and a good dose of common sense we isolated an LNA that was not performing quite right. We could have done it several other ways but not without auxiliary test equipment.

So we like the Washburn receiver. We'll put more in down here in the fringes of good TV because it works that good. But (as they say) it is not perfect.

In the hand held remote selector use we noticed a tendency for the AFC to pull the picture slightly off center tune into the **black** sparklies area. This is not a design flaw, nor was it a serious problem but it did arrive down here that way. It was correctable. We also noticed a strange tendency for signals on WI1to'pump'; levels came and went (in both the remote and manual tune modes) by a dB or so. We were going to call Clyde on the telephone on this one but for several days our long distance phones didn't work and then when we switched the receiver to the FI antenna system we didn't have it anymore so dropped it for now.It could have been a WI1 problem but we doubt it.(We have seen some strange variations in WI1signals down here on the 11 foot ADM antenna and would put little past Western Union at this point!)

If Clyde Washburn has a problem it is his attention and his basic honesty. The man reminds me of a cross between Abe Lincoln and Benjamin Franklin. He takes it on the chin when he feels he has to and has the dogged determination of a winner. His next biggest problem is production capability. He told us how many would have been shipped by February 1st; not an insignificant number but he needs to do better. He will.

Starting about the time you read this The Washburn TVRO Receiver will be available in increased production quantities and there will be some modest cosmetic changes. We asked Clyde when we could expect **a new** version and he just smiled. "**This unit is constantly changing in subtle, productive ways. If we can change something to get better or more reliable performance we do it. If we can't get that result, we leave it alone**".

Benjamin Franklin couldn't have said it better.

TECHNICAL CORRESPONDENCE AND NOTES

SWAN FEEDHORN TIPS

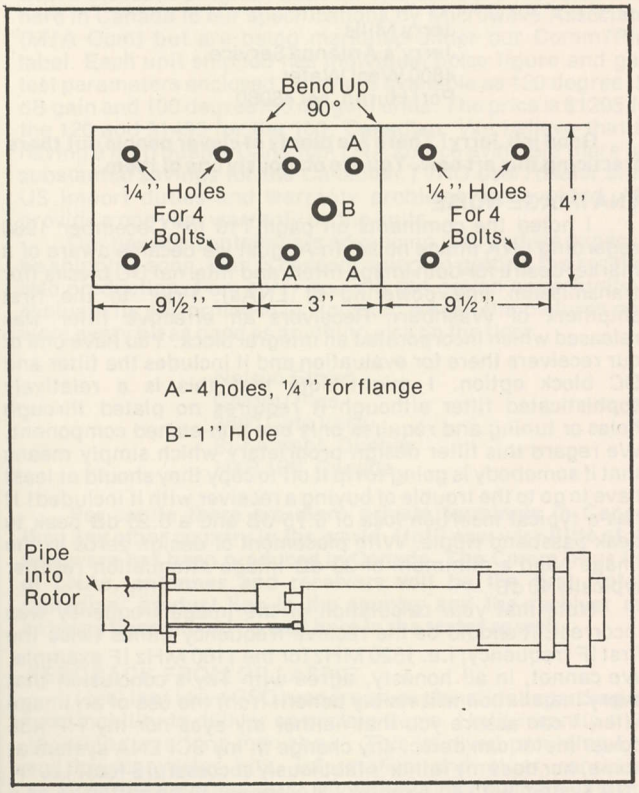
It is my opinion that the Swan 23" horn does not work well at all. While I have the utmost respect for the pioneering work and determination of Oliver Swan and followed his work extensively in **CATJ** and then **CSD**, I believe the feed can be improved. I believe the 23 inch horn **under** illuminates the dish surface. To gain a couple of dB give or take a tad shorten the horn's length from 23 inches to 15-7/8". The openings in the front should be 8-½" by 6-¼".

An excellent rotor for this feedhorn design is the Alliance

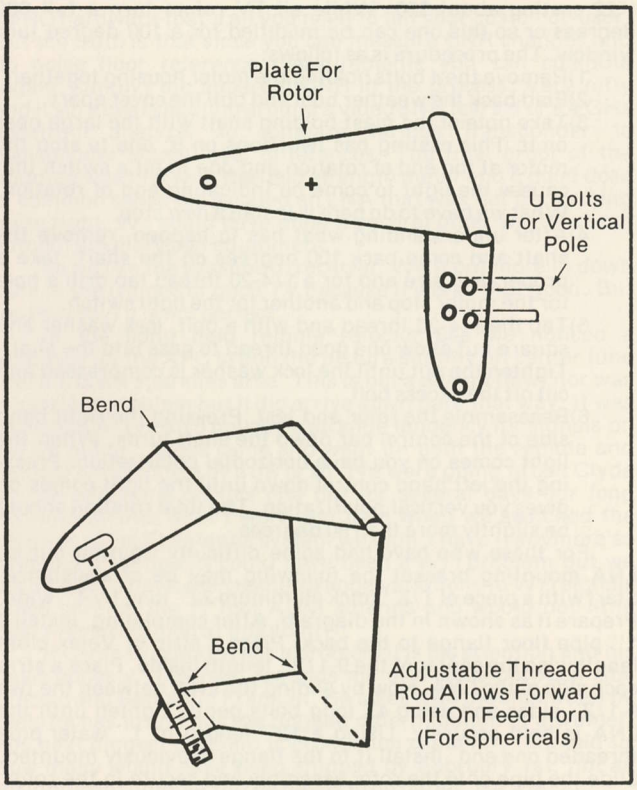
K22 costing about $30. While all TV rotors turn a full 360 degrees or so this one can be modified for a 100 degree turn window. The procedure is as follows:

1)Remove the 4 bolts holding the motor housing together
2)Fold back the weather boot and pull the cover apart
3)Take note of the mast holding shaft with the large gear on it. This casting has two stops on it; one to stop the motor at the end of rotation and one to hit a switch that causes the light to come on indicating end of rotation. What we have to do here is install a new stop.
4)After understanding what has to happen, remove the shaft and come back 100 degrees on the shaft; take a proper drill size and for a 1/4-20 thread tap drill a hole for the motor stop and another for the light switch.
5)Tap the 1/4-20 thread and with a bolt, lock washer and square nut allow one good thread to pass into the shaft. Tighten the nut until the lock washer is compressed and cut off the excess bolt.
6)Reassemble the rotor and test. Pressing the right hand side of the control bar down the shaft turns. When the light comes on you have horizontal polarization. Pressing the left hand control down until the light comes on gives you vertical polarization. The total rotation should be slightly more than 90 degrees.

For those who have had some difficulty figuring out an LNA mounting bracket the following may be of assistance. Start with a piece of 1/8'' thick aluminum 22'' long by 4'' wide. Prepare it as shown in the diagram. After completing, install a 1'' pipe floor flange to the back. Place a strip of Velex cloth lengthwise the center of the 9-1/2'' length inside. Place a strip each side of the LNA. Now by sliding the LNA between the two 9-1/2'' sides and using 4'' long bolts gently tighten until the LNA is held securely. Using a 12'' length of 1'' water pipe threaded one end, install it to the flange previously mounted. Slide the pipe onto the rotor assembly and secure in the rotor. The coax lines goes inside of the 1'' pipe through the flange and to the N connector on the LNA. Be sure to use some strain relief at the end of the pipe to stop the coax and N connector from twisting.



Lastly to deal with the mounting system for the rotor, LNA and feed horn assembly, I suggest locating a large ''barn



door'' hinge. Reshape the hinge as shown here. The LNA plus feed then mounts to the ''platform''. I hope this all helps someone. Everything works great for us with sparklie free pictures on SATCOM FI on a 6 foot projection screen receiver.

Jerry Mills
Jerry's Antenna Service
4800 West Water
Port Huron, MI 48060

Good job Jerry! There are plenty of clever people out there practicing this art now. You are obviously one of them.

LNA IMAGE NOISE

I noted the comments on page T10 for December 1980 regarding LNA image noise. In August we became aware of a market desire for both image filters and internal DC blocks (for transmission line powering of LNAs). Prior to the first shipment of Washburn Receivers an effective filter was released which incorporated an integral block. You have one of our receivers there for evaluation and it includes the filter and DC block option. I might note that this is a relatively sophisticated filter although it requires no plated through holes or tuning and requires only one non-etched component. We regard this filter design proprietary which simply means that if somebody is going to rip it off to copy they should at least have to go to the trouble of buying a receiver with it included! It has a typical insertion loss of 0.75 dB and a 0.25 dB peak to peak passband ripple. With placement of design zeros in the image band a minimum of 30 dB image attenuation results; typically 40 dB.

Note that your calculation of the image frequency was incorrect; it should be the receive frequency minus **twice** the first IF frequency; i.e. 1520 MHz for the 1100 MHz IF example. We cannot, in all honesty, agree with Tay's conclusion that **every** installation will visibly benefit from the use of an image filter. I can assure you that neither my eyes nor my HP 436 power meter can detect any change in my SCI LNA system at home, nor does my father's fabulously successful 8 foot/120°K LNA system with an Avantek LNA appear to be suffering as a result of not having the filter. We do, on the other hand, have reports from competent sources of grief with Amplica units.

Evaluation of the LNA noise output at the LNA (Tay does not specify in what bandwidth the -75 dBm is measured) is only a possible predictor of results. A long feedline can make a good LNA look bad because the image at 2 GHz (or less) is attenuated by a lower amount than the 4 GHz signal desired. For your example frequencies 60 feet of RG-214 would attenuate the desired signal by 15 dB but the image frequency by only 8.5 dB, making things 6.5 dB worse at the receiver than they started out at the LNA. We concur that an image filter is to be highly recommended for installations coupling **multiple receivers** to a single antenna and it was for this condition that we created and offered as an option our own image reject filtering system.

Clyde Washburn
Earth Terminals
Fairport, N.Y. 14450

Since first visiting this subject we have put two ICM Purifier "active filters" **into our Turks and Caicos system. We agree with Clyde to the extent that when the Purifier follows a Dexel LNA and is ahead of either an ICM or Washburn receiver, we cannot see** (nor can we measure) **any improvement in the picture quality. When we install a Purifier after a 1978 vintage SCI 100 degree LNA or a 1977 vintage SCI 120 degree LNA there is a substantial improvement with the ICM receiver but none with the Washburn reciever** (which as Clyde notes already has a filter built in). **Apparently current SCI/Gardiner LNAs are acceptable without external filtering. This additional note: having the gain control built into the Purifier does provide the installer with another tool to 'balance' a system input to the receiver.**

COMM/PLUS PROGRESS

Chris, Daniel and I left Houston with a general good feeling about the show. We were very pleased with the response to our product(s) and have sent out around 150 answers to potential dealers whom we talked with in Houston. We are now offering LNAs here in Canada to Canadian dealers with a discount program built in. The units are manufactured here in Canada to our specifications by Microwave Associates (M/A Com) but are being marketed under our Comm/Plus label. Each unit shipped has individual noise figure and gain test parameters enclosed. They are available as 120 degree/50 dB gain and 100 degree/50 dB gain units. The price is $1295 for the 120 and $1495 for the 100, **Canadian**. We believe that by having a high quality Canadian LNA source available there are substantial savings for the Canadian TVRO user/dealer since US import duties and warranty problems are avoided. We provide a one year warranty on the units.

Our new dish antennas is advancing well and we expect to be shipping soon. Dan is concentrating on getting the receiver into production. I am sorry you did not get an opportunity to evaluate its performance in Houston; we felt the pictures on it were every bit as good as anything else on the floor.

Nelson Ethier
Comm/Plus
3680 Cote Vertu
St-Laurent, Quebec
H4R 1P8, Canada

Per capita there are more private terminals in Canada than any other country in the world. Until now very little of the hardware has been produced in Canada. The Comm/Plus line of LNAs, antennas and receivers will be the first 'totally Canadian' product line in the country and the receiver and antenna lines should do well here in the states as well.

FEEDBACK FROM GILLASPIE

I feel that I owe **CSD** readers an explanation regarding our past inability to deliver on certain items. Until recently I was trying to run a 'one man show'. This involved providing LNA and downconverter kits, information and other consultant services to experimenters. My willingness to share information and expertise was soon recognized by satellite fans throughout the nation and I was deluged beyond my capacity. I was trying to provide all of this while holding down a fulltime job that taxed me heavily and involved a long commute each day. For about the past ten months my mail has averaged perhaps 20 pieces per day and the telephone calls around 10 per day, starting very early in the morning since people in the east refuse to recognize that we are three time zones earlier out here!

Kits were often sold with marginal profit and some times given away. Information was given free. In addition to this I

was trying to put together a full image-reject mixer which has now finally matured. About a month ago I finally recognized that the demands were not going to diminish and if I was going to continue to burn the candle at both ends I was going to have to get some assistance. At the present time my 'staff' consists of a colleague design engineer, a business manager and a secretary who also handles the order desk. An office has been established with a business telephone and an order processing procedure has been established. We are attempting to check out all past orders to ascertain that nobody has been missed or forgotten in the shuffle. Our order desk is open daily from 9 AM to 4:30 PM (pacific time) and we accept COD, VISA and Mastercharge. In most cases we are now shipping kit orders within five days of receipt of order.

We consider a complaint to be an indication of a problem in our organization. If there are problems, we need to know about them so they can be corrected.

Norman Gillaspie
HI-TEK Satellite Systems
177 Webster Street, Suite A455
Monterey, CA 93940

Gillaspie got started with an article describing a single conversion mixer system appearing in the June 1980 CSD. **Subsequently people ordering boards and kits from him often found delivery problems. The matter came to a head late this past fall when several readers wrote** CSD **to report their dis-satisfaction with Gillaspie. We are very pleased to see Norman has made the jump from part-timer to dedicated supplier. He has talent and the industry needs people with energy, youth and talent.**

TECHNICAL NEWS NOTES

FLICKER CITY - if your receiver seems to have the 'flickers' on some FI and D2 transponders don't automatically blame the receiver; the problem **could be** in the uplink service. WGN, for example, had bad case of flickers for some months. Problem is that the FCC required 30 hertz dithering rate must be synchronous with video. Their's was not. Over on D2 tests indicate some of the services totally neglect to have 30 hertz present. Others have been measured with oddball 15 hertz dither rate. This causes picture to flick(er). And it is illegal. Even on FI some services (such as CNN) have been noted **without** 30 hertz waveform present from time to time.

VIDEO recording from bird and your receiver? If you are having poor results it may be your TVRO receiver rolls off video frequencies so abruptly on high end that your recorder cannot handle baseband format. Solution? Use TVRO receiver with better control of baseband video format.

LOOK FOR considerably changed receiver formats by summer. Many receiver suppliers now working on two-part approach; front ends (typically with LNA and downconverter married together) that exit with 70 MHz IF signal that is carried indoors to additional 70 MHz sections and demodulators. Also look for carefully re-engineered video processing systems in **next breed** of receivers. "Soft-Video" will be the catch phrase; consisting of video processing designed to minimize appearance of sparklies by 'hiding' them behind video (baseband) processing.

AFTER tests with 12 foot antenna in Maracaibo, Venezuela which produced reasonably good pictures on COMSTAR D3 Caribbean video feed (transponder 24 when tests were made) major US oil company now installing 9 meter parbolic for attempt at FI. Nobody on South American continent has **yet** achieved **satisfactory** results from FI with any size antenna although results on some transponders with 11 meter antenna in Bogota (Columbia) area have been judged 'viewable'.

INITIAL RESPONSE to COMSAT DBS proposal was largely skepticism. Most concern seems to be that the programming aspect offers 'nothing new' and that the technology is also 'nothing new'. COMSAT's proposal for 200 watt transponders (3 active per bird with 3 in standby mode) also draws fire; opponents pointing out present C band birds are going to 8.5 watts (from present 5) and **may** be up to **50 watt per channel capability** by date COMSAT will be first operational.

FCC responding to strong negative reaction from broadcasters and networks over tentative approval of low power TV stations has set a limit of 15 such stations per applicant on interim basis. FCC's action limits number of applications single applicant can file (some have prepared 100 +) pending **final** FCC decision in matter. Action does **NOT** effect 1 to 10 watt VHF translator applications; only higher power (100 to 1,000 watt) UHF (typically) applications. Anyone contemplating use of VHF translators, modified by waiver for use as satellite relays, need not be concerned.

Additional applicants for 1,000 watt station-networks now on file at FCC include Satellite Syndicated Systems (Tulsa, OK operator of SPN, WTBS common carrier, etc.), Graphic Scanning Corporation (Englewood, NJ proposing satellite fed subscription service), Buford Television (Tyler, TX proposing satellite feed of WBTI Cincinnati and STV programming).

SPACE SHUTTLE likely to have trial test now March 14th. First flight will have extensive TV coverage, last 54 hours. Some mis-conception about Shuttle; it will **not** take geo-stationary birds to 22,300 mile altitude. Rather will have maximum operational altitude around 650 miels, and geo-stationary satellites will be "re-launched" from that altitude into final 22,300 mile elevation. Dreams of 'driving to sick DOMSAT', getting out and 'fixing it' are not and never have been part of Shuttle technology.

SENATOR BARRY GOLDWATER, ham radio buff and new head of Senate Sub-Committee on Communications has installed own TVRO. On legal question, he said "I have received conflicting opinions". On future of service he notes "I have always been brought up to believe that if it is transmitted through the air, it is available for private use".

SPTS '81/WASHINGTON - April 17, 18 and 19 [1981]

SPTS '81/WASHINGTON - The Shoreham Hotel

SPTS '81/WASHINGTON - Registration fee $150 [includes your choice of either of TWO new Manuals from STT

SPTS '81/WASHINGTON - Brought to you by the same folks who create CSD, SBOC, study Manuals and videotapes; Satellite Television Technology!

SATELLITE PRIVATE TERMINAL SEMINAR

Three information and equipment filled days starting at 10 AM on April 17th [but we suggest you arrive on April 16th to watch the antenna setting up exercises] and closing at 3 PM on April 19th. As many as 2,000 satellite TV enthusiasts, from would-be dealers and distributors to technology/equipment designers and innovators will be on hand to share and learn all there is to know about low-cost satellite TV terminals! Twin sessions featuring "business opportunities" and "satlelite technology" will focus on the important state-of-the-industry today. PLUS - an opportunity to share our technology with important Senators, Congressmen and their Aides. AND - if the lodge at The Shoreham, more than 30 hours of "in-room" satellite TV programming from past SPTS/SBOC events; the history and technology of an industry being born!

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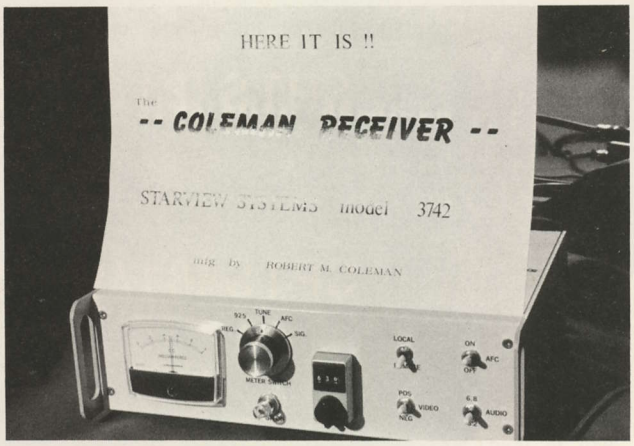

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YOUR CHOICE - 100 degree (!) K, 50 dB gain top of the line LNAs for just $1095. OR - Avantek 120 degree K, 50 dB gain low noise amplifier with the new 'power block' DC coupling system that allows you to use your TVRO downline for powering! Instant delivery on this top grade LNA at the unbelieveable price of $795!

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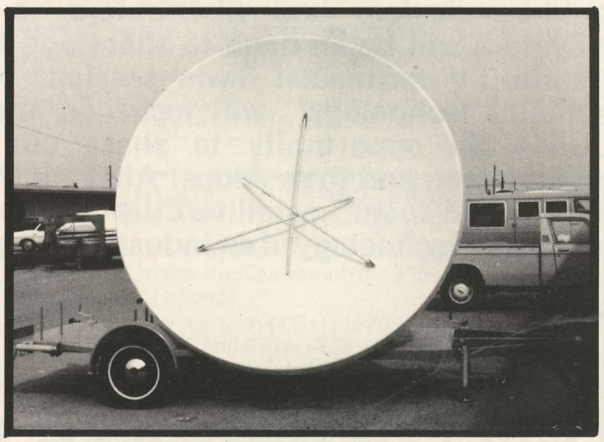
Get in on the ground floor as a TVRO dealer in your area! Starview Systems provides you with everything you need; professional instruction plus the finest mobile sales terminal on the road today. Included is a 10 foot Starview parabolic equipped with rotating feedhorn, Avantek 120 degree K LNA, top of the line Starview 24 channel tuneable receiver, 75' of coaxial and connection cables plus a trailer to get you to the demo site and operational in 30 minutes time. And the price? An unbelieveably low $6,495!!!



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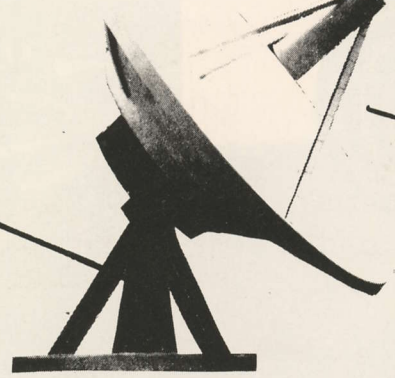
PROTECTIVE LNA COVER TO MATCH ANTENNA COLOR

STRONG TUBULAR ALUMINUM STRUTS
NO WIRES EXPOSED

USES ONLY FOUR FOOT SQUARE PIERED PAD



STREAMLINE PACKAGE — NO GEARS, BULKY MOTORS, CHAINS, ETC.

PATENT APPLIED

COOP'S SATELLITE DIGEST P1-2/81

COOP'S COMMENT ON PROGRAMMING

WHO HAS DECREED...?

A recent letter from English TVRO pioneer Steve Birkill notes "**I think** this young industry needs something of a shake-up...". Steve echoes a concern I have had for the better part of a year. That being, I don't see as much innovation as I think we are capable of generating.

I have always been keen on innovation; even when it ultimately fails to work out. For this reason I was 'high' on John Rohner's combo LNA and receiver when he announced it last spring. John never got it into production and that was a pity. But John tried, and his reported handling of deposit checks for his equipment aside, he is to be commended for daring to think outside the normal channels of thought.

Birkill goes on. "**And just** who is it that has decreed there's only one or five or even one hundred ways to design a receiver"? Steve notes, with accuracy, that each month of **CSD** seems to bring announcements of new 'designs' when in truth "**...they all** use the same VCO, double-balanced mixer and demodulator. OK - so Tay Howard created a design that could be duplicated easily at low cost. But does everyone have to follow so closely his lead???"

Steve greatly admires Tay of course. He is not picking on Tay. Quite the contrary, his concern is that after Tay shows people how to do it, the innovation stops. "**I see** Clyde Washburn out there on a limb as the only guy doing anything really different and even his main difference (apart from his being early into the race) is his demod. It gets to the point that all of the suppliers seem to be making radios of not very professional construction, following one basic (Howard) design, to sell for between $500 and $1,000. The only significant differences are the knobs, screws, toggles, bells adn whistles!".

Steve is quite correct of course. When somebody deviates from a 564 PLL demod or a 70 MHz IF or the Avantek VTO...that becomes news! So why should *he* (or anyone else) care about an apparent lack of innovation in this field?

Years ago the American consumer looked upon Japanese 'gadgets' as mere carbon-copy duplicates of original work done in the United States. "**We design it**...they take it to Japan and copy it. And bring it back cheaper than we can make it here!" was a familiar cry. To some extent that is what has been happening with TVRO receivers since late in 1979. Substitute Tay Howard for 'America' and substitute everyone else for "Japan" and you get the picture.

What about the discriminator receivers; such as the new Coleman Starview or the tried and true AVCOM or the Barker (GHz)/KLM image reject units? Are they not original? Coleman's unit is actually quite straight forward in design; some of the bells and whistles are innovative however. The AVCOM unit bares a great deal of similarity to some of the 'professional class' Microdyne gear. David Barker's image reject scheme is more a case of taking proven technology developed for other (microwave) applications and putting it to work for the 3.7 to 4.2 GHz band than it is true innovation. None of these manufacturers are to be faulted; all have 'brought it back cheaper...' and to some extent that is in itself innovation.

So why the passion for innovation? There are several good reasons why we should be innovating rather than 'cheapening'.

Marketplace demand is one excellent reason. As John Ramsey at Sat-tec learned before the rest now wrestling with mass production techniques, as long as we continue to stay on the same path as the professional class receivers we are fighting a battle that we will ultimately lose. Japan learned this after a decade or more of copying and cheapening. They did **well** letting America do the innovating but they have done **far better** now that they plug upwards of 10% of their revenues back into new product design and innovation. The facts are clear; 4 GHz microwave video receivers, following techniques **first pioneered** by Bell Telephone Labs back in 1947-8, do not lend themselves to high quality, mass production techniques. Not as long as 1981 satellite video receivers are merely 1981 versions of 1948 radios created by Bell Labs.

So when you can't play a good game following the rules...**you change the rules**. That's what Japan did early in the 70's and the BETA and VHS format video recorders and the $600 color video camera are but two examples of what happens when you say 'Hey - let's stop this cheapening and start all over again'. The time has come for satellite video receivers to stop copying Taylor Howard's original design and start being their 'own man'.

Microwave innovators with a touch of consumerism and class are hard to find. With the scant exception of radar detectors and microwave ovens, the world of microwaves does not infiltrate the consumer marketplace. Microwave innovators work on multi-million dollar military contracts or professional system contracts; everything they design will be used by technicians and other engineers. Making the jump to consumer products is no small task. But there are signs that it is coming and the first company into the marketplace with a consumer oriented 4 GHz video receiver had better be prepared for the ultimate compliment; a thundering herd of 'me-too' radios created by people who will still not have learned the lesson Japan learned more than a decade ago.

CSD PROGRAMMING

COOP'S SATELLITE DIGEST (Programming Section) is published monthly by Robert B. and Susan T. Cooper doing business as Satellite Television Technology (STT). Editorial offices located at West Indies Video, Grace Bay, Providenciales, Turks & Caicos, BWI. Communication with business office is through Business office at P. O. Box G, Arcadia, OK 73007 (405-396-2574); Rick Schneringer, Manager. Photography, Kevin Paul Cooper; editorial assistance Tasha Anne Cooper. STT produces various manuals, videotapes, guides and texts plus conducts the twice annual SPTS and once-annual SBOC events. STT is not affiliated with any manufacturer or distributor of satellite communications equipment. **CSD** subscription $50 per year US / Canada / Mexico; $75 elsewhere.

SPACE GOES ON OFFENSIVE

The Federal Communications Commission is presently conducting studies (through Notices of Inquiry) into the matter of establishing an 'interim' DBS (direct broadcast satellite) service for the United States. Some opponents to DBS argue that the US must await the results of a 1983 Regional Administrative Radio Conference (RARC) before authorizing any type of DBS service. Such opponents, largely broadcasters, argue that if the US establishes (12 GHz) DBS service prior to the 1983 Conference other nations in the western hemisphere will be less likely to agree to a comprehensive 'regional space plan' because (they feel) the US has 'jumped the gun'.

Proponents of DBS, seeking an interim policy, include COMSAT which has filed with the FCC a detailed proposal asking for formal approval of its plan to provide 12 GHz DBS service. To sort all of this out the FCC has initiated studies into DBS and S.P.A.C.E. (the industry's Society of Private and Commercial Earth terminals) has been active in filing formal industry views on this proposal. One recent filing follows.

COMMENTS ON NOTICE OF INQUIRY

SPACE (The Society for Private and Commercial Earth Stations) is an association representing the owners of earth stations that receive communications from satellites as well as manufacturers, distributors and sales representatives of satellite earth station equipment. Accordingly SPACE and its membership are vitally interested in the issues posed in this Notice of Inquiry (Notice). In addition, we are encouraged by the Commission's apparent desire to facilitate the prompt provision of DBS service.

A principal objective of SPACE is to promote the private use of earth stations in order to provide the American citizenry with greater diversity of television programming and to enhance their educational, informational and entertainment opportunities. SPACE's goals in this regard are identical to the Commission's goal of "opening new channels to allow an opportunity for diversity of voices in order to further the goals of the First Amendment, and satisfaction of consumers' preferences for programming." In just six years satellite delivered television and subscription programming in the United States has blossomed. It presently provides additional sources of programming to the American consumer as well as increased business opportunities for the equipment manufacturers and suppliers. SPACE anticipates that the introduction of DBS service will go even further in opening up new channels of communications for all Americans particularly those residing in rural areas. In addition it will serve to promote competition in the marketplace thereby fostering additional viewing opportunities for the American consumer.

In the Notice issued the Commission seeks comment upon many aspects of a proposed Direct Broadcasting Satellite (DBS) service. In Part IV of that Notice comment is requested upon the appropriate regulatory approach which should be adopted to govern any satellite systems authorized by the Commission prior to the 1983 broadcasting-satellite conference ("Interim Systems"). Separate comment and reply deadlines are provided for this aspect of the Commission's Inquiry. SPACE herein provdes comments on certain aspects of the regulatory approach which the Commission should adopt respecting these interim systems. We shall address more fully other aspects of the Commission's Inquiry in comments to be filed subsequently in this proceeding.

In its Notice the Commission specifically requests comment upon the advisability of permitting a DBS system to operate on an **experimental basis** prior to the 1983 Western Hemisphere Regional Administrative Radio Conference. Initially, it should be realized that **there already exists in the United States**, today, a significant and growing satellite to home transmission service. The means for such transmission service has been in existence for a half decade and it is now rapidly expanding. **It is**, in effect, **an interim DBS system**. The cost of equipment necessary to receive this satellite delivered service is about one tenth of what it was when the service was commenced. The service consists of the programming presently transmitted on U.S. domestic satellites.

Initially this form of "DBS" was used to provide a low cost alternative to terrestrial microwave for the distribution of entertainment programming to the headends of cable television systems. Local distribution of such programming was provided by such systems to the individual subscribers' homes. It was perceived by program suppliers and cable television operators that there would be a demand for additional commercial television programming as well as other programming. That perception has proven accurate, and satellite provided programming to cable television headends has expanded significantly within the last five years.

In its early years of development cable television grew by filling a demand for additional sources of commercial entertainment and other programming. History is repeating itself in the growth of other distributions systems including receive only earth stations. Cable television construction, as the Commission is aware, is extremely capital intensive. As a result, to date, only some 22 percent of American homes receive cable service. Yet the demand for additional sources of entertainment programming is not limited solely to those areas receiving cable television service. In many rural areas throughout the United States, for example, where there are fewer entertainment alternatives, the demand for additional sources of educational, informational and entertainment programming is even stronger. Privately owned "backyard" earth stations are presently being used in many areas to bring new programming sources to consumers residing in these locations. Earth stations are also now providing programming to residents of apartment buildings and condominium housing units.

The demand for more video sources is being filled by ingenious entrepreneurs who are designing, manufacturing and marketing many different types of satellite receive only earth stations and related equipment. Estimates of the number of receive-only earth stations presently in existence and which are not associated with cable TV system ownership are as high as up to 10,000 units.

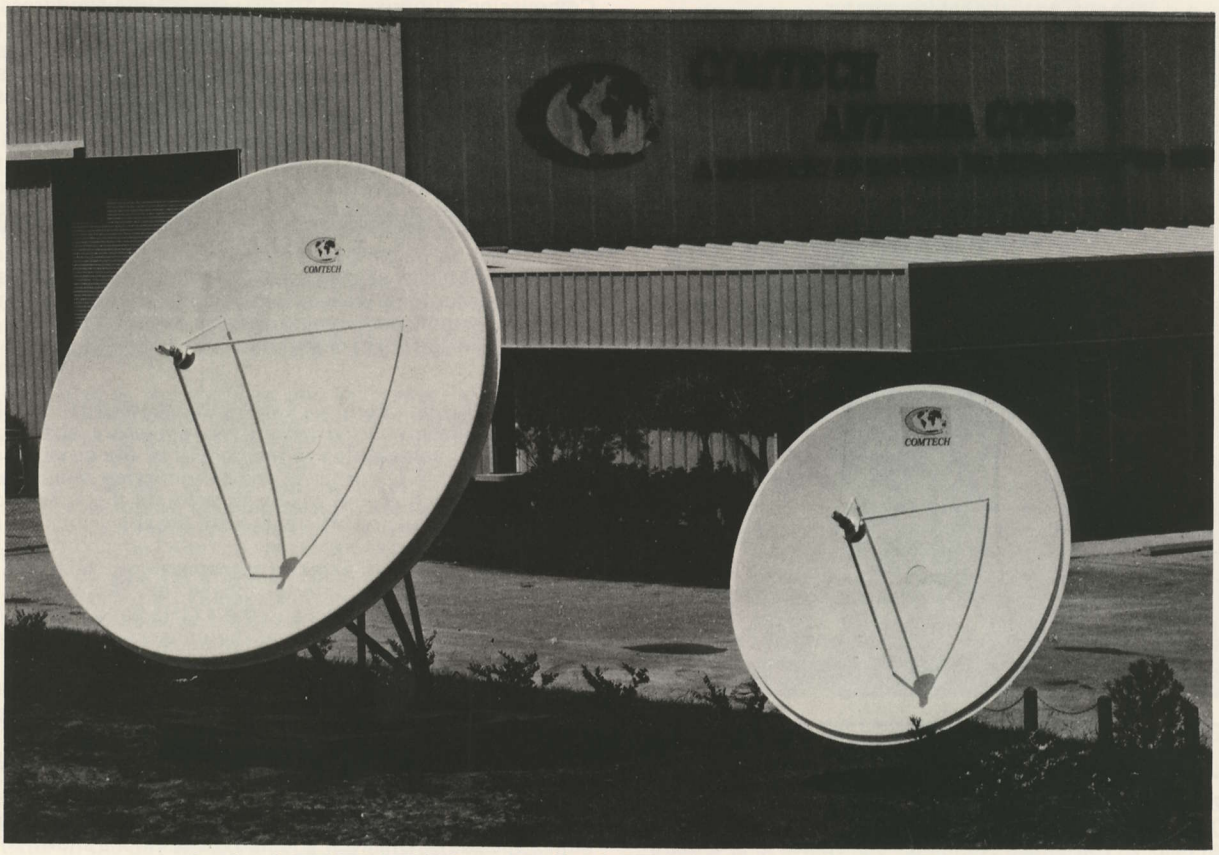
There is, however, a critical difference between the earlier years of cable television development and these, the early years of satellite earth station expansion. Historically, cable television operators took the position that if the signal was in the air, freely available to anyone to receive, transmission of such signal for commercial gain did not result in copyright liability. If anything, cable television operators argued they should be paid for increasing the audience available to the broadcaster. In short, cable television operators **refused** to pay for the programming which was used in their business. And that refusal was twice upheld by the Supreme Court. It was not until 1976 that Congress rewrote Copyright Laws to impose a fee for transmission of television programming by cable television operators.

While SPACE might have taken a position analogous to the one historically taken by the cable industry, it has chosen **not** to do so. SPACE maintains that as reponsible members of the communications community, the users of earth stations **should pay** the marketplace price for the use of "subscription" programming. **Neither SPACE nor its membership desire a**

FOR THE DEMANDING CUSTOMERS

COMTECH OFFERS...

EARTH STATION ANTENNAS



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free ride. The association recognizes that if "subscription" programming were not paid for the logical conclusion would be that such programming would disappear. By subscription programming SPACE means such programs that viewers on cable systems must pay to view, i.e., where the program supplier (not the common carrier) derives revenues directly or indirectly from the viewer. **Because the private user provides the ground facilities**, SPACE takes the position that the marketplace rate is the one charged to others in a similar position, e.g., the charge to the cable operator.

What has been the response on the part of program suppliers to SPACE's position? Some program suppliers have indicated an interest in serving the private market by direct satellite reception. Others, however, in particular Home Box Office and Showtime have **refused** payment by earth station owners for either "backyard" use or commercial use e.g. at apartment houses. Non profit "backyard" use of satellite earth stations violates neither the Copyright Laws nor Section 605 of the Communications Act of 1934, as amended. SPACE's subsequent comments in this proceeding will more fully address this issue.

However, the point to be made now is that considering the other media and communications interests of the major program suppliers to the cable television industry, the motivation for refusing to deal with non-cable television affiliates users of satellite earth stations is suspect. The refusals to deal are not in the public interest. Indeed, SPACE believes that serious antitrust implications are raised by such actions.

Many members of SPACE have received letters threatening law suits by program suppliers such as HBO. These threats should no more deter the expansion of services delivered by satellite than the broadcasters' threats detered the expansion of service delivered by cable television. In both cases the technology is there, the public desires service and entrepreneurs will provide that service to the benefit of the consumer.

Despite thirty-five years of telecommunications services, rural Americans continue to be underserved and disadvantaged. Even consumers residing in more urban areas will benefit from the competitive spur provided to established technologies by receive-only earth stations. **A Commission sanctioned right of access** to the educational and entertainment programming available on existing and future domestic satellites **is absolutely required.**

We raise these issues at this time because they are critical to the future development of the domestic satellite industry as well as the fulfillment of Commission objectives. Should the Commission authorize an interim service it must address this critical issue at the outset. While it does not have the power to enforce the Antitrust Laws as such, the Commission has the obligation, as part of its public interest mandate, to consider antitrust issues in its deliberations. To insure that services are in fact expanded in the most rapid and efficient manner, the Commission should make clear to existing and future providers of domestic satellite service that they may not **deny** their product for anticompetitive reasons to any segment of society **willing and able to pay** for it. It must unequivocably establish that there is a right of access at rates determined in the marketplace to existing and future entertainment programming distributed by satellite. Anything short of such a rule will result in a repetition of past anticompetitive conduct on the part of an established communication service against a new entrant to the detriment of the consumer.

In conclusion, here, we believe that the Commission has a unique opportunity to structure its regulatory approach to foster greater competition to the benefit of the consumer. To fully exploit this opportunity the Commission should adopt those rules which are necessary to promote the expansion of service and the full and efficient use of the spectrum. Included among such requirements is a right of access at fair marketplace prices to satellite transmissions. Adopting this approach during the interim phase of DBS operations, including existing operations in the 4 GHz band will facilitate the growth of such services and the enhancement of viewing opportunities for the American public.

SYNOPSIS - COMSAT DBS

COMSAT dropped more than 1,000 pages of paper on the FCC just prior to Christmas detailing its proposal to provide a direct broadcast service to the United States using frequencies set aside for this purpose in the 12 GHz band. The essence of the COMSAT proposal, arriving at the Commission while the FCC is already studying whether it should approve on an 'interim basis' a DBS type of service for the US, is as follows:

1) Four satellites would be **operational** in the mature system. They would be located at 115° west, 135° west, 155° west and 175° west.
2) Each satellite would have the capability of providing three channels of simultaneous television.
3) **Two spare satellites** would be launched in the mature system; initially COMSAT wishes to launch the 115° west satellite which will be for the eastern time zone. A 'spare' satellite would remain in orbit 1/2 degree away in space, ready to be activated should the primary bird fail. According to the filing the 1/2 degree offset spacing of the spare bird would be close enough to the primary bird that should the primary fail the spare would immediately take over service and viewers would not know the difference.
4) **Receive antennas** will be in the 27" range. The antenna and downconverter electronics mount together, outside. The inside portion of the package includes the demodulator, descrambler and remodulator.
5) Satellites to be used will be customized for service. **Each will carry six transponders**, three for service and three for spares. The uplink and control would be from Las Vegas, Nevada; chosen because the area has a minimum of rainfall per year thereby reducing uplink signal deterioration caused by heavy precipitation.
6) COMSAT estimates the 12 GHz frequencies to be employed will suffer from local precipitation with areas such as Miami most affected (calculations shown Miami may experience a cumulative total of 15 hours of outage per year).
7) **Each viewing home will be 'addressable'**; each will have a 'code' and the service will transmit a stream of coded data telling receivers to turn on or off based upon the payment status of each. Subscribers will be able to subscribe to the 'Superstar' channel (movies, concerts), a 'Spectrum' channel (classic films, children's programs, cultural programs) or a 'Viewer Choice' channel (adult education, sports, pay-per-view sports). The addressable system will allow viewers to select (for a special extra fee) a special program or event separate from the regular service on that channel.
8) COMSAT says the service could begin in the eastern time zone '**as early as 1985**' with national service operational 9 months later (i.e. 1986). This is based upon COMSAT receiving formal approval for the service 'within one year'.
9) No 'hard numbers' for programming service fees were included in the filing but studies filed with the application talked of monthly service fees in the $20 to $30 per month region.

Technically, the COMSAT application to the Commission is not part of any on-going Commission study or area of interest. However, with the Commission preparing itself for the 1983 Regional Administrative Radio Conference, and with a Notice of Inquiry outstanding that seeks input on the question of authorizing an 'interim' DBS service, the weighty application cannot be considered to be unrelated to ongoing Commission activities.

WEST INDIES VIDEO REPORT (Part IV)

ON THE AIR

As you may recall we left the West Indies Video project towards the end of the 1980 year with power, land and some equipment problems. 1981 started off with a much better slant on life.

I traveled to the states in mid-December, slipping into Oklahoma via Florida in time to put the finishing touches on the January issue of **CSD**, then traveling to Washington, D.C. where SPACE VP Rick Brown and I terrorized several hotels seeking a location for the spring measuring ballrooms, checking hotel rooms, arguing about hotel lodging rates and trying to eyeball 'satellite clearance' for local buildings and trees.

"How do you know where north is?" he asked. I had forgotten to bring a compass with me (not uncommon) so I pointed at my shadow on the ground. It was within minutes of 12 noon. "My shadow is pointing north" said I, "give or take a few degrees". Rick turned to the young lady who was representing the hotel and noted "I hate people who can point at their shadow and say 'that is north' ". My retort was that I had read the **Gibson Manual** several times and I learned how to do these 'clever' things there. If I ever get stranded on a desert island I want Steve Gibson with me. Even over Susan since I figure Steve would get me **off** the island far faster than anyone else I know.

Later in the day we were debating between two possible hotel locations. As you know from the announcement appearing elsewhere here we chose one finally. "Back to the parking lot where the antennas can go" I commanded. "Again?" he asked. **"Yes, the sun is just in the right position to be** in line **with FI right now"** I responded "and we can look at the parking lot to see where the sun light is hitting. Any place that has sunlight will be OK to install an antenna for FI". He smiled and said casually "**I guess** I have to read Steve Gibson's Manual".

Seven days to almost the minute after leaving Provo I was landing again in Miami. After two quick stops to pick up some special connectors for WIV I headed for Bob Behar's office. Bob had just returned from a trip into Columbia (the South American country) and he had some potential problems with a private terminal he was planning there. "**How can we find out** what signal levels to expect from Satcom and Westar some 100 miles out of Bogota?" he asked. I told him there was no such information available at either RCA nor Western Union. "How come?" he wanted to know.

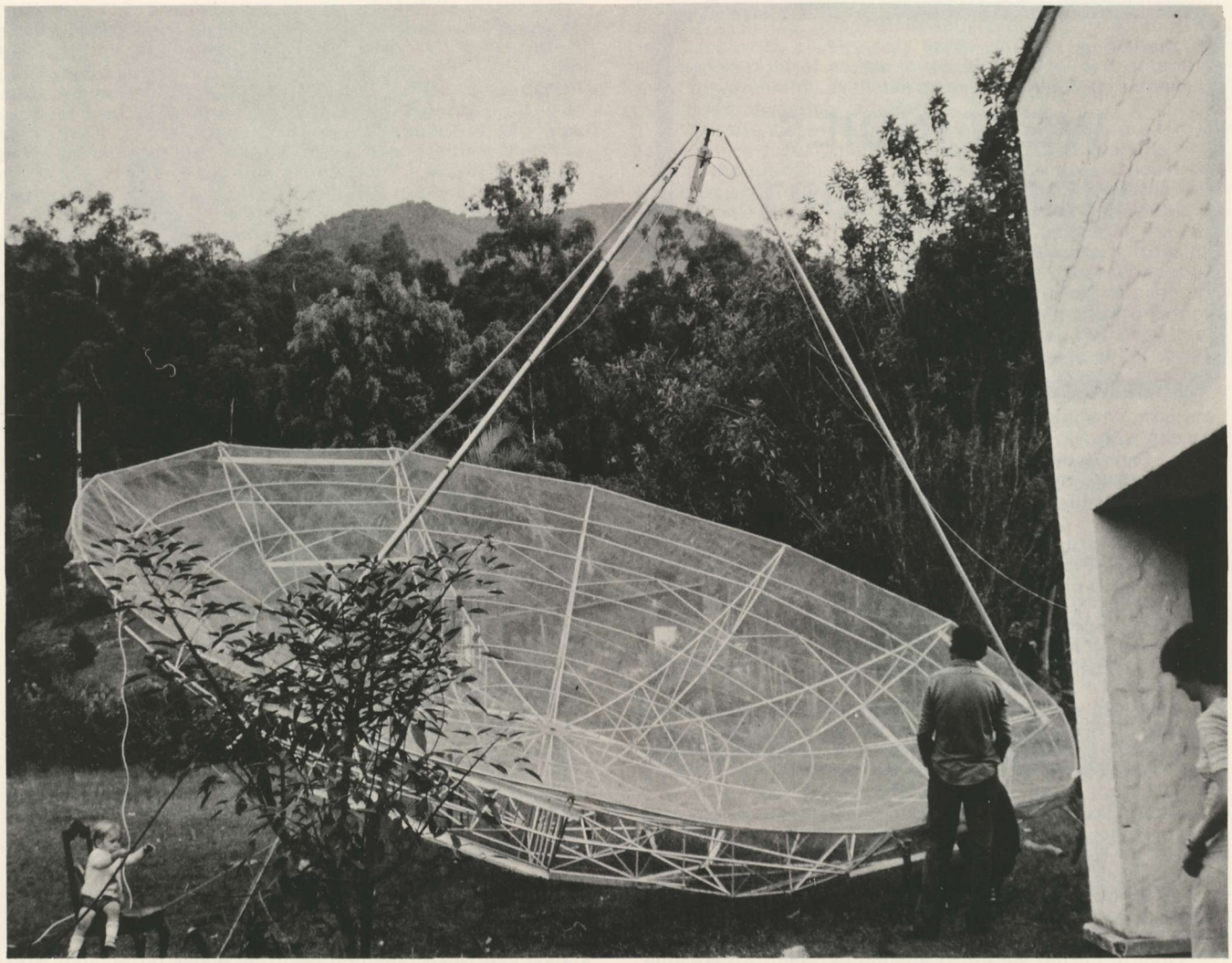
Well, the folks at RCA Astro and Hughes have an interesting technique for measuring the satellite transmitting antenna 'patterns'. The pattern or shape of the downlink signal 'footprint' is determined by the way the antenna is configured. Before the antenna system is mounted on the bird it goes through terrestrial 'antenna test range' testing. There it is fed a signal and the test range plots or maps the strength of the signal at boresight (in the center) and then down the edges in all directions. They know that from 22,300 miles above the equator just what portion of the pattern they will measure on the test range is going to hit Iowa or Montana or Southern

AFC 5 METER dish going on the pad at Provo. Power company boom truck was used to lift antenna onto AFC mount.

California. They also know what parts, far down the side from the center, are falling outside of CONUS (**con**tinental **U**nited **S**tates) and when they get down the edges far enough with their tests and measurements **they simply stop making anymore measurements**.

"Columbia is so far outside of the CONUS region the test range measurements are simply not applicable" I said "You cannot call RCA or Western Union and ask them to tell you what the EIRP levels will be in Columbia; **they don't know**" I added.

Behar was obviously up against it. He had a client ready to purchase several terminals but he had to be confident the system would work when installed. "It looks like the only way to be sure the system will work is to go down there with some type of decent sized antenna **and make some measurements**" he offered. He was right. And it turned out that an earlier SPTS attendee, Hector Posada who lives at Medellin, Columbia (several hundred miles from the projected installation location) was about ready to go into a 'testing' mode. Hector had gone home from Miami convinced he **could build** an antenna that **would bring in** US satellite signals. He had done some calculations and determined that a 28 foot (approximately 9 meter) antenna was going to be required as a bare minimum. **So he built one.** Hector's 28 footer is constructed from 1 inch by 1 inch aluminum channel. He has a 120 degree LNA and a Microdyne receiver on it. In a visit there Behar inspected the antenna and although a mount was not completed Hector rounded up around three dozen helpers and they 'walked' the antenna into position where COMSTAR D3 was found and then INTELSAT's Brasil feed. "The pictures on both were perfect" noted Behar. Ah yes, but D3 and Brasilsat's 26 dBw footprints were a long ways from where one might expect FI or the WI, 3 or D2 birds to be.



28 FOOT HOME BUILT dish of Hector Posada in Columbia; antenna is constructed from 1 inch aluminum channel to "very rigid standards" reports Bob Behar. Antenna has been proven on D3 and Intelsat to date.

One antenna manufacturer had run the numbers for Behar on its computer. They told him he could expect 15 dBw signals from SATCOM at his projected location. They also told him that if he bought **their 11 meter dish**, put a 20 degree Kelvin parametric amplifier on it (a mere $65,000) and ran into a 7 dB threshold receiver he would be in the 48 dB signal to noise region on FI. I told Behar their computer was inhaling the same stuff Columbia is so well known for.

"First of all SATCOM results in Panama tell us that **not all transponders are equal**. Far from it. On a 45 foot dish in Panama City ten of the 20 transponders are right at threshold with 65 degree parametric LNAs. The other 10 can hardly be seen since the antenna patterns on FI start to 'ridge' very badly on the sides".

Ridging. It is an interesting 'ripple' effect one gets with SATCOM family and COMSTAR family birds. When two or more antennas are joined together (FI has four total) to make up a 'composite' boresight beam there are effects on the side known as ridging. This is where the antenna segments operate first 'in-phase' and then 'out of phase' with one another. This 'in' and 'out' business creates ridges or ripples of signals where signal ridges are followed by signal valleys. Signals are up and then as you go further out (away from boresight) the same signals get weak while another set **may** (no guarantee) get strong, followed further out by the reversal of 'strong' and weak sets.

"Hector Posada in Medellin **may find** useable signals on some transponders while a fellow 200 miles away may find useable signals on an entirely different set of transponders. Or none at all". I wasn't high on Bob's chances of success and after he described his client I wasn't sure I would take the chance on 'missing'. I left Miami concerned about Bob's chances of success noting as I did "**Well, somebody has to be a pioneer here**; and even negative results, if the tests are properly conducted, are important for the data base we are accumulating". I wished him well and headed back to Provo on the funny little two-engine Beech aircraft which I had come up on nine days prior. With me were several important parts to get WIV operational by the first of the year.

When the local power mogul had neglected his obligation to complete the 220 VAC power hook-up for our Grace Bay studio/Annex back on December 1st we had cut TV service back to a mere 30 minutes per day. We stayed with the 30 minute live (via satellite) US network evening newscast at 7 PM but cut out the rest of the temporary 4 hour per day service hoping that local pressures would get power where common sense had failed. **It worked**, and on December 24th we returned to the four hour per day schedule. In a sense it looked like a Christmas present for Provo (since we were and still are **not charging for** the service). Actually it just worked out that way in timing.

While I was traveling **to** Florida, Oklahoma and Washing-

ton Edmund Ewing was installing a 20 foot Rohn 25G tower atop our 'mountain' where he hung a pair of channel 4 75 ohm yagis for transmitting purposes and a pair of vertically mounted channel 7 yagis for our STL (studio to transmitter link). Back at the Annex he waited only seconds after the rock masons finished laying native stone against the east wall of the Annex before he slapped another 30 foot Rohn tower into position against the building to hold our studio-end pair of ten element channel 7 yagis. The day I returned he was completing work on the Vidiark 12 foot Spherical antenna and burying some 4 inch PVC through which the transmission lines (we are using 7/8ths inch cable down here plus some of Andy Hatfield's RG-217) would be shoved.

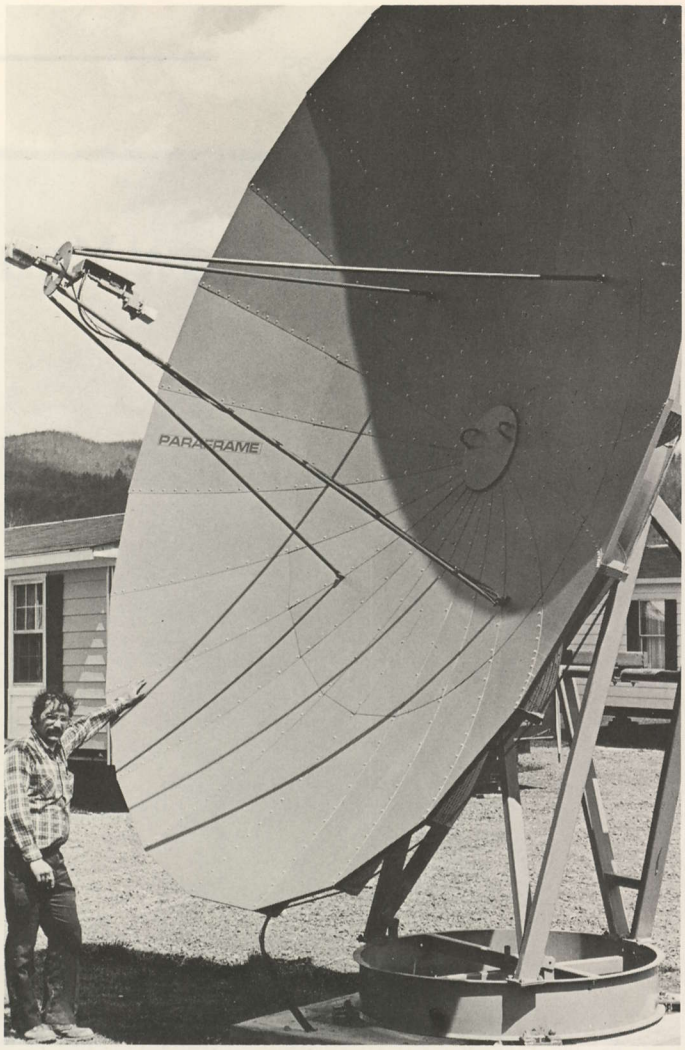
Off the 16 foot AFC/Microdyne dish we have extremely good pictures on all of the FI channels. Well, all but 21 which is down several dB from the rest. With twin 85 degree Dexel LNAs on the 16 footer we are not messing around with FI. Actually we were pleasantly surprised by the AFC antenna's peformance. Two computer studies we did before coming down told us to expect below threshold on F1 with a 16 footer. We have a 20 footer coming in which was ordered before the 16 foot tests were completed. We'll use it for Europe feeds via Ghorizont, Intelsat's Brasil feed and some of the weaker US domestic birds.

To buy some time for the lengthy installation of the TV studio and control room gear at the Annex I decided to plug WIV's "free" service for the island into various F1 and other bird signals. For 14 days early in January we switched to a new transponder at 9 AM each morning and allowed that transponder to run until 9 AM the next morning. For the two weeks of 'relay service' we concentrated on getting our complex system wired and operational. Provo loved it. They got a concentrated look at all of the major services we would be watching ourselves and developed a new feeling of what satellite service meant.

Our Provo installation will, about the time you read this, run a varied combination of satellite, tape delayed, local taped and local live programs through the control room. I love the control room. It is high enough above ground that you look down on the Caribbean blue of Grace Bay some 75 feet away. Out another window you see the 16 foot AFC and the Vidiark Spherical framed against the southwestern sky. Another wall, directly in front of the operating position, looks through an eight foot double glass 'window' into the large studio where programming is produced. Right now, while the 'Big House' portion is being completed daughter Tasha is sleeping on the 'stage' at the far end of the studio. Kevin has a temporary bedroom downstairs in the 'study', a room adjacent to a separate radio control room where WIV-FM will be originating. He doesn't spent much time down there however; if he is not outside chasing underwater creatures with his small boat he is upstairs in the TV control room learning all he can about editing TV programs.

Those who have been with us for several months will recall that the local electrical service is at best inconsistent. **60 hertz it is not.** In the Annex I convert the local AC (56 to 64 hertz, 105 to 145 volts) into DC and I store it is a bank of heavy duty batteries. Out of that bank of cells I draw 12 volts and drive a Topaz sine-wave inverter that re-produces 117 VAC at a true 60 hertz (+/- .5 hertz). The Topaz unit is limited to about 1 kW of AC so we use it sparingly, feeding a special color-coded set of AC outlets in the TV studio, TV control room and the radio control room. All of the frequency sensitive gear plugs into these outlets; video tape decks in particular.

Then I decided last November to get away from AC tape deck operation where possible. I disposed of the standard VHS and BETA decks and went to 12 volt operated 'portable' decks. I wanted 'direct drive' and decks designed so they were not in any way dependent upon the local AC 'hertz' service for drives and so on. If the hertz were going to wander on the AC lines I determined I would have to bail off of hertz and go to DC. So our VHS and BETA machines are now run off of a 12 volt source. **I wanted to develop solar power** for the Annex (solar cells are very attractive) and was hot on the trail of a US firm that was reported to have reduced the costs of these arrays to $6 per watt. I don't consider $6 a watt cost effective but it is



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NEW! The SIX METER Paraframe antenna! 45.4 dBi of real world gain so you'll equal 8 dB receiver threshold (using a 100°K LNA) with a squalid 27.1 dBw satellite EIRP. Real world performance equal to many 7 meter antennas costing over $12,000.
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New **low visibility** mesh surface from Paraframe! 3.66 meters of tough industrial mesh surface for 40.9 dBi of real world on site gain. With 8 dB C-N threshold and 120°K LNA, satellite minimum is just 32.2 dBw.

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Satellite Cable Company	
Pocatello, Idaho	208-232-2606
Smith Radio-TV	
Ely, Nevada	702-289-4645
Jerry Peake Company, Inc.	
Silver Spring, Maryland	301-587-2515
Red's TV Service, Inc.	
Farmville, N.C.	919-753-3074

getting better all of the time. Unfortunately after you got in touch with this particular firm you are subjected to a 'bait and switch' sales approach. The $6 per watt arrays (36 to 40 watt **arrays** are common) are "back ordered through 1983" or some such nonsense **and all they can delivery** 'within 90 days' are $19 per watt arrays. Well, so much for solar arrays this year.

There is one more bit of power company business unfinished. Before we went to Houston in November I stayed up two nights in a row **editing together** a one hour look at the WIV operation. We shoot lots of videotape of what we are doing and I wanted to show people like you how you can take satellite TV service and change a small corner of the world into something better than you found it. I did this on our Sony 3/4 editing system, taking not enough time to verify that I had laid down a solid sync bed to begin with. With the Sony (and other) system you run the tape you are going to use as the master through the record machine to lay down a 'sync bed'. Then you go back and insert edit the piece putting it together a few seconds at a time, using the original sync bed to establish a reference to which the new inserted pieces will lay down. I finished this epic at 4 AM on the day I was to leave for the states at 11 AM. Exhausted after the marathon editing session I took a shower and decided to run it through (once, and for the first time) before catching some sleep. The two day effort was terrible. So bad that I declined to run it in Houston although **parts** of it are borderline excellent. I cannot allow mechanically impure video to represent us when I know we know how to do better.

I arrived in the states back in November, heading for Houston, determined to find someone to take the Sony stuff off my hands. The 3/4 inch Sony system (2860A, 430, 2260) are excellent pieces of gear. **In Oklahoma** they worked flawlessly. **Down here the wandering 60 hertz turns their productivity into mush more often than not.** I knew the answer. Panasonic had it. Direct drive 3/4 inch editing gear that runs everything off of 12 volts DC. Gawd I was learning to hate AC and its wandering hertz! It took a second trip to Oklahoma in December to work out a swap of the Sony gear for the Panasonic 3/4 inch editing system. Just to be very sure we would never (ever) again be bothered with unstable sync and 'glitchy' pictures WIV went further in hock and picked up a Microtime time base corrector. I'll have more to say about the Microtime unit at a later date.

All of this came together around the first of the year. After dumping the 110 (?) AC operated VTR gear, switching to Panasonic from Sony, adding the Microtime TBC and making a few other changes we were finally on the right track. **To all of those who suffered this fall while we took far too long to get STT videotape orders filled, now perhaps you will understand that we were** not **goofing off!**

Wiring of the TV studio and control room is proceeding as I write this. I have around a mile of RG-59/U and several thousand feed of twisted pair and various other non-video cables coming off of reels as this is written. We cleaned Provo out of 1/2 inch PVC three separate times just rounding up enough to wire up the Annex. When I came back down in December our two engine Beech had 200 feet of PVC stashed in between the seats. It was in good company. Under the 10 seats were boxes of fittings, tape, junction boxes, switches and what have you. I rode co-pilot that trip because the ten seats were filled with this group from Sweden who had flown from Europe to Miami to spend the holidays on our island. They had never ridden in a small plane before.

"Do you always have to ride with your bag on your lap?" a lady asked me in heavily accented English. I assured her that was normal. **"How old is this airplane?"** another lady asked. They figured I was part of the crew since the pilot-owner, Ed Hegner, was allowing me to help him pack the airplane with baggage and freight. Most of the latter was mine. **"Just well broken in"** said I forgottening for the moment that it first flew 35 years ago. She glanced at the instrument panel and the cracked-glass-covered instruments stained yellow with age and probably decided I was in error. After learning that I live on Provo and was not part of the airplane operation one of the Swedish men took me aside.

"**Why do** you **fly to Provo this way**" he asked "**when you could fly Air Florida**?" I tried to explain that Air Florida is nice and comfortable but by landing at Grand Turk and having to

then come back west to Provo on the Turks and Caicos National Airline you actually spend more time getting to Provo than you did with Hegner. "**Yes, but you don't have to carry your bag on your lap!**" he replied.

I smiled to myself wondering how he would have handled an earlier flight I had made on one of Hegner's Beech planes. Two people rode from Provo to Florida sitting on the laps of those who had been fortunate enough to get a seat. They left Provo barely acquainted and arrived in Florida good friends. Four hours of sitting on a lap will do that to people, especially when the gentlemen carries the lady in his lap.

SPRING SPTS ANNOUNCED

EASTER IN DC

When S.P.A.C.E. General Counsel Rick Brown first approached us to shift a then-planned SPTS in the spring from Chicago to Washington, D.C. we felt the chance of finding a facility large enough and spacious enough for our 'crowd', on such 'short notice', was slim at best. Large hotels, capable of handling 1,000 plus crowds with plenty of exhibit space are typically booked up two to five years in advance.

We almost gave up but Brown persevered and we came down to making a decision between **not holding it** in Washington **or accepting** a three day period built around the Easter holiday. We accepted the Easter weekend since, as Brown likes to repeat, satellite television is going to be closely scrutinized in the coming session of Congress. By holding SPTS in the capital the opportunity for attendees and SPACE to invite Senators, Congressmen and aides to attend the sessions offers us chance to acquaint them with our new technology. And by holding the session in Washington, we can perhaps get a few guest speakers from the would-be regulators as well. **Senator Barry Goldwater**, for example, the new head of the Senate Communications Sub-Committee has been working on **his own TVRO** (!) at his Arizona home. The Senator may have it up and running by now. Here is one man who will have a great deal to do with any proposed legislation in the new session of Congress and we doubt there will be much education necessary with this enthusiast!

So **Spring '81 SPTS** will be held **April 17, 18 and 19** (a Friday, Saturday and Sunday) in Washington, DC at The Shoreham Hotel, a massive 750 room facility with space to spare for both exhibits and attendees. By holding it over that weekend we will be also making it possible for many people within driving distance of Washington to attend who might not be able to get away during the week.

Here is the registration procedure:

1) **A registration card** appears in this issue of **CSD**; look for the center insert and the top card facing towards the P1.

2) **When we receive your registration**, you will receive a written confirmation back from SPTS assigning you a registration number. Hold onto that number. You will **also receive** a separate registration card which you will send off to The Shoreham to hold your room there. **NOTE:** A block of 550 rooms for SPTS, at special rates, have been set aside for the period starting on April 16th. The block of rooms will be held only until March 26th however **so you must register EARLY**, and get your hotel card back to The Shoreham prior to March 27th to get in on the SPTS deal. After the 26th on March, you may be on your own trying to find a room in Washington.

Each attendee will receive as a part of hie/her registration fee **a choice** of either of two new manuals which STT will be releasing at SPTS. More about that in a month or two.

4) We will be piping through The Shoreham's master antenna system approximately **30 hours of special TV programming** created from the past SPTS/SBOC events. You are invited to bring your own VCR if you wish and to tape the MATV system feed to take home with you some of the historical events and technology of this young industry for later study and sharing. (**Note:** The Washington sessions will not be carried through the MATV system; selected sessions will be next shown at SPTS San Jose this summer.)

Spring '81 SPTS will be conducted similar to the San Jose SPTS of this past summer. **The general theme** of the gathering will be the **business opportunities** presented by the exploding home satellite terminal field. **BUT** - by running twin sessions for portions of Friday and Sunday, we'll have the opportunity to give the high technology enthusiasts a good series of updates on the advances in antennas, receivers and LNAs. In short, **we plan a balanced session with plenty of activity for everyone attending**.

The middle day, Saturday, will be largely devoted to exhibit hall activities and a few special demonstrations. Plus a session for S.P.A.C.E. where Taylor Howard and Rick Brown will bring everyone up to date on what by then may be a clearer indication of what legislative problems may crop up in 1981.

For those who have never attended an SPTS/SBOC gathering previously, we have the following advice:

1) **You will be totally engulfed** in activities from the moment you arrive (we suggest you plan to arrive Thursday afternoon or evening; the 16th) to the minute your plane leaves. You will be surrounded by satellite equipment, satellite people and even in the sanctity of your own room you will find your TV set 'speaking satellite' to

you. The closed circuit TV satellite program feeds, incidentally, start at 7 AM and while they don't conflict with seminar sessions, they do run until midnight or after.

2) Mid-April is generally thought to be the most ideal time to visit Washington. Cherry Blossom Time is an occasion for festivals and special activities. **You** won't have time for any of that **but your family will** if you want to make it a family trip.

3) Don't arrive tired. That puts you at a distinct disadvantage since we guarantee you will be worn out from all of the goings-on after three days. If you get in, as we suggest, on Thursday you'll be treated to the set-up exercises for the several dozen expected parabolic and spherical antennas that will fill The Shoreham parking lots. You learn a great deal by watching the antenna people put their antennas together and observing their 'bore sighting' exercises. The outside antennas will be 'fair game' for Thursday but the inside exhibits won't be accessible until Friday noon.

4) If you simply can't make it on Thursday, try to be there **before 10 AM on Friday** the 17th since the first sessions get underway at that time. The last sessions will close at 3 PM on Sunday.

The Shoreham is located so that in reasonable traffic you can make the cab ride from Washington National airport in between ten and twenty minutes. Dulles Airport, to the north, is a bus ride. You are just minutes from the White House and other local tourist attractions.

For all of those in the east, and especially on into New England, who have been asking for an SPTS in your neck of the woods... **this is your chance**. With a big country to cover and the upper midwest losing out this spring it may be more than a year before we get back that way. And as anyone who has been in this crazy business for a year or longer knows, a whole lot of changes can be expected in an intervening year!

See you in Washington in April.

PROGRAMMING CORRESPONDENCE

DIGITAL CHANNEL DISPLAY

My associates and I have developed a digital channel display (12 and 24 channel format) which is readily adaptable to any VCO controlled satellite receiver. Basically the unit consists of an analog to digital converter controlling LEDs by E-PROM. The converter is built on double-sided glass board measuring 3.5 x 4'' and the display is 1.5'' square. Powering (+12 to 20 VDC) is taken directly from the receiver (LNA) supply line. We are prepared to offer these (programmed in accord to the individual customer's VCO) wired and tested for $150 in US funds.

Larry D. Brailean
6423 1st Ave. North
Regina, Sask., Canada

Anyone who has tried to eyeball the channel they were actually tuned to, with an ICM or Washburn (or other dial calibrated knob) **receiver should appreciate this new option. Send us down a unit for the ICM 4300, Larry, and we'll test it and report on it here in** CSD!

SPACE FORMATION TAPE

In the December issue of **CSD** there appeared a letter in which the writer was looking for a videotape of the formation meeting of S.P.A.C.E., out in San Jose this past July at SPTS. I was the 'chap' Coop mentioned taping the event and I have prepared a dub of the tape for Russell Keene and sent it down to Louisiana. I am also sending along a dub for STT so it will have a complete archive of the beginnings of S.P.A.C.E., plus I am enclosing a T-shirt for Susan which ought to make the natives in Turks & Caicos wonder which tourist boat she just got off of!

Alan M. Armbruster
Alascom
Fairbanks, AK

Al's T-shirt reads ''People In Alaska Don'tTan - They Freeze''. **His tape provided an entertaining 30 minute visit at an RCA Alascom site where Al works. Susan, Tasha, Kevin and I felt** 'guilty' **munching on fresh lobster caught in the Caribbean that date, lounging in 80 degree weather and planning the next day's attack on the sea while Al was showing us how he dresses for his** -55 degree **weather! Thanks Big Al - you are a heck of a guy.**

DUTCH TVRO?

We thank you for the Satellite Study Package; a great deal of useful information is packed into the Handbook. Our firm has decided to enter the private TVRO field here in Europe. Trendatech will sell and distribute terminals in the Netherlands, Belgium and Germany. Most of the firms listed in the 'Handbook' manufacture gear for the North American market. Perhaps those who have equipment which is adaptable for the European home TVRO field would contact us so we can

work out mutually satisfactory arrangements for distribution of that equipment here in Europe.

Wilfred L. Amstelveen
Muskateer/Eagle Assets
P. O. Box 53
1391 AB Abcoude
The Netherlands

SHORT SPACING PANIC

The FCC has authorized the expansion of domestic satellite systems in the 4 GHz band (see **CSD** page P16, January) and I understand that as a part of this move they are likely to approve reduction of present 4 degree (minimum) satellite to satellite spacings to 3 degrees. Won't this hurt small diameter TVRO receiving systems since the reduced spacing will create 'bleedover' between adjacent satellites?

Michael L. Comer
9474 Abingdon Court
Manassas, VA 22110

Nope. This is a much repeated 'story' concocted by either ill-advised people who like to cry wolf, by the present satellite system operators who fear more competition (reducing spacing will make room for six or seven new birds at 4 GHz), **or by commercial antenna suppliers who want to see everyone buying 15 foot dishes. The truth is that a 10 foot dish looking at 131 degrees** (for example) **will have the adjacent satellites at 128 degrees and 134 degrees down by 18 to 25 dB. Now in tests run by ITT and others more than four years ago it was found that unless two** video **signals are within 12 dB of one another** (i.e. the non-desired or adjacent satellite is within 12 dB of being as strong as the desired one at 131 degrees; our example) **the human eye cannot tell the second signal is even there. It happens that as dish antennas get smaller, the antenna's ability to separate signals from adjacent satellites is reduced. There is some point as antenna size reduces where the 3 degree separated satellites** would **cause interference with the desired signals. It happens that this point happens down between 6 and 8 foot antenna size** (that is a conditional statement assuming certain antenna feed parameters and antenna f/D ratios); **a size that is not adequate for** most **US users. For those who like to visualize the satellite belt, here is a** CSD **drawing of the belt as it is today and as it will be by say 1986. Things will get crowded but not on the ground if you stay at ten feet and larger!**

PRIVATE STUFF

The enclosed photos show the appearance on WESTAR III, transponder 5 (9 on a 24 channel receiver) of something called **Private Screenings**. It was first noted on December 6th.

Andy Hatfield
AVCOM of Virginia, Inc.
Richmond, VA 23235

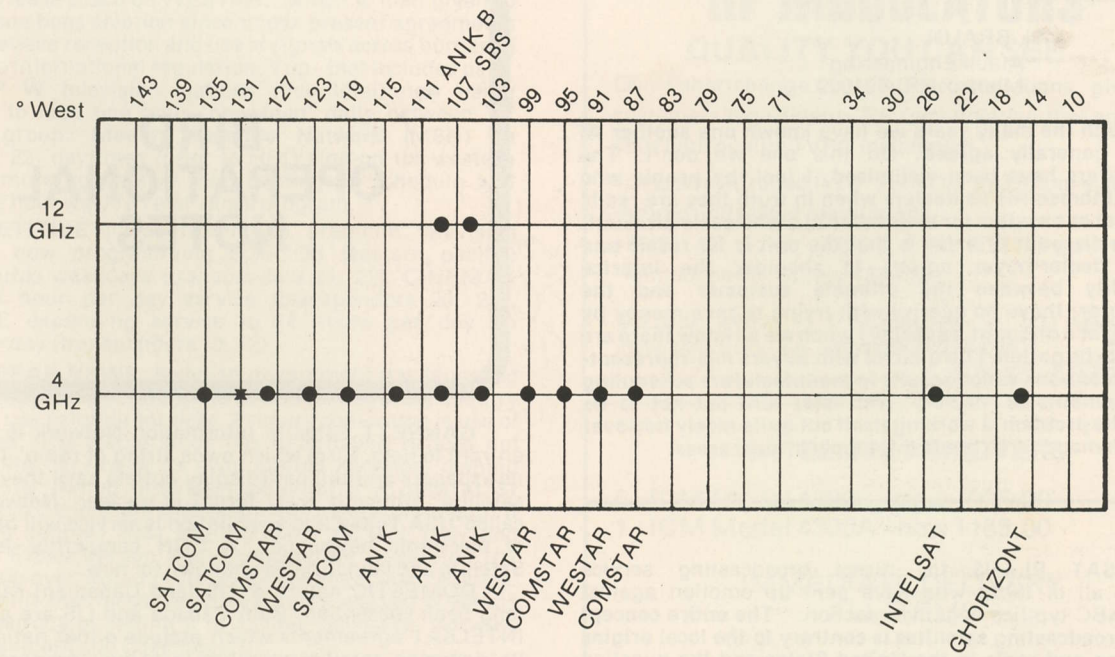
Private Screenings is the newest cable TV service programming. It consists of R movies (they say four out of five have strong sexual content) **and it comes up on Friday and Saturday at midnight** (eastern) **and repeats at 3 AM for the west coast watchers. The operator, Satori, insists there is no 'X' rated stuff on their service but unfortunately very few people can really tell the difference between 'strong sexual content R' and X stuff anyhow. To each his own.**

DEALER PACKAGING

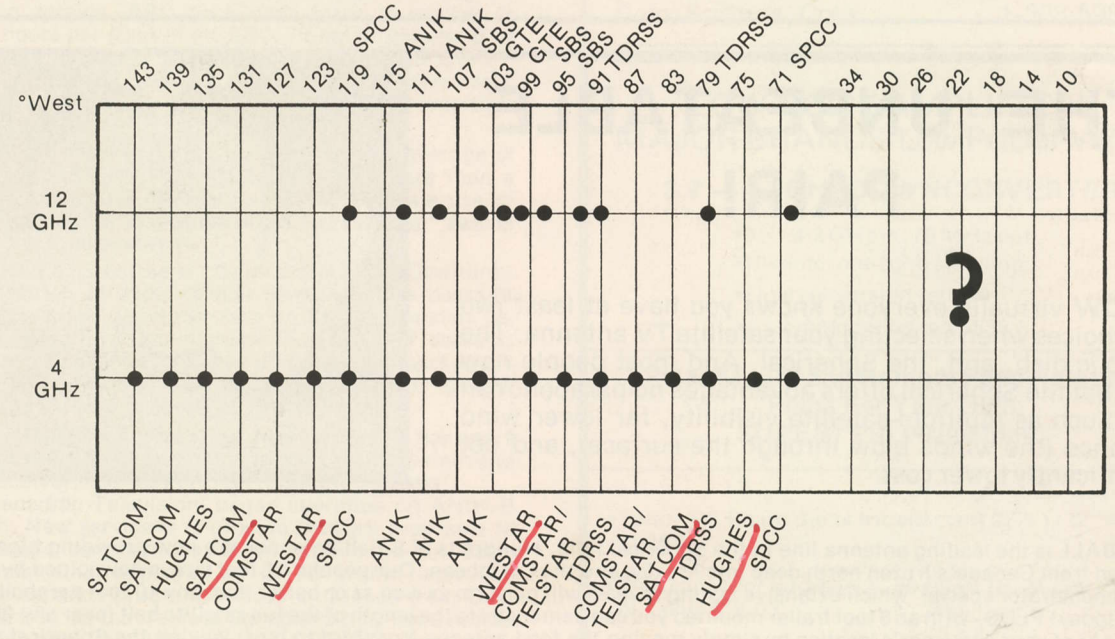
I read with interest Chuck Colby's views on packing home systems for the retail buyer in the October issue of **CSD** and I agree with him. However with the rapid development of new hardware, each supplier of home terminals should do everything possible to constantly stay up with new hardware and constantly adjust equipment to give the consumer the best package possible.

William C. Davis
David Enterprises
Columbus, Ohio 43229

I have read much about dealer pricing in **CSD**. What is the hub-bub all about? If the manufacturers want to sell their hardware, all they have to do is to qualify the dealer by insisting that he have a state issued re-sale license. I do **not** agree that a 'dealer' has to buy a quantity of units to qualify as



1981 ORBIT BELT



1985/86 ORBIT BELT

a dealer. We deal in many items that we purchase wholesale in quantities of one. Good grief; how can the small dealer get started if they are forced to go through the hassle of buying big quantities they can't immediately 'turn'. Our first system installation was a high priced one because we had to pay through the nose. Then we had to mark it up to show a profit. This resulted in a really high price to the customer although due to our low overhead we were eventually able to become competitive to the 'big boys'. I don't think there was really any need for all of this but because we were new in this business we could not buy wholesale. It is really a mystery to me. Do the manufacturers really want to sell to us or are they trying to

impress us with their complex marketing plans and ability to generate paperwork?

AL BRAUN
Alaun Engineering
Montrose, CA 91020

Through the many years we have known one another Al we have generally agreed. On this one we don't. **The manufacturers have been victimized,** I feel, **by people who represent themselves as dealers when in truth they are really trying to get one system for their home at a wholesale discount. The whole discount premise is that the unit is for resale and that the dealer-buyer agrees to shoulder the interfce responsbility between the ultimate customer and the manufacturer. Ihave no quarrel with trying to save money by purchasing at a discount, especially when we all know there are discounts to be gotten. I do quarrel with buyers mis-representing their intentions which results in manufacturers scheduling future shipments to** 'dealers' **who later turn out not to be dealers. The problem is working itself out quite nicely however since the demand far exceeds the supply in most areas.**

COMSAT PLANS for direct broadcasting service unleashes all of those who have pent up emotion against concept. ABC typifies negative reaction: ''**The entire concept of direct broadcasting satellites is contrary to the** local **origins of television and radio in the United States** and the question must be dealt with by the Congress.'' Broadcasters have long maintained that national or regional services would impact upon localized TV station operations. COMSAT promises to use 'off hours' to experiment with ''high definition'' television, perhaps 1,000 lines (versus present 525). Such transmission will not be intended for 'general public'.

BIRD OPERATIONAL NOTES

GANNETT Satellite Information Network is latest new entrant to field. Firm which owns string of radio, TV stations, newspapers and billboard display outlets says they will 'go to satellite' although exact forum is unclear. Network will be called '**USA Today**' and speculation is service will be some type of electronic newspaper. A CNN competitor is possible. Satellite and launch dates unknown for now.

DOMESTIC nature of US (and Canadian) satellites has long been contention. Both Canada and US are signators to INTELSAT agreements which prclude either nation allowing its 'domestic' satellite operators to do business across national borders. In past limited experimental programs involving Canadian monitoring (via satellite) of river flow rates in Oregon have required high level diplomatic corp meetings and tedious agreements. Now SBS has formally asked US government for permission to serve half dozen locations in Canada. At present Televisa (Mexico, DF) uses WESTAR III

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by going through INTELSAT which uses its US partner COMSAT to lease space on WESTAR...which is then given to Televisa. Issue begs solution since under present agreements both sides believe reception and use of signals across border(s) is contrary to international regulation. Yup - that includes us.

GROUP W television stations (five total) now using WESTAR I to feed one hour 'newsfeed' daily between TV stations in group. **Modern Satellite Network** (MSN) on transponder 22, daytimes (prior to HBO sign-on for western US) taking more aggressive role; beefing up schedule and adding three hour weekly TeleFrance program.

COMPETITIVE juices flowing in premium television field. HBO now programming 5:30-7:30 (eastern, pacific) Disney features weekdays (transponders 24, 22). CINEMAX now full 24 hour per day service (transponders 20, 23). SHOWTIME expanding service to 24 hours per day on Friday-Saturday (transponders 10, 12).

EUROPEAN NEWS. Swedish government has launched 15 month long period of 'study' to define just how the country can and will use satellite services. Primary contention is use of DBS services. The Netherlands has determnied it does not need a satellite service of its own. United Kingdom leaning towards jointly owned broadcast satellite; **if** it goes at **31** degrees west it could share with Spain, Portugal and Ireland. **If** it goes at **19** degrees west sharing could be with Italy and Yugoslavia. Either system would concentrate on serving UK and some slop over would cover Ireland and northern France. Planners admit that larger antennas would expand coverage for those desirous of having it to include Germany, Norway, Belgium, Denmark and Luxembourg.

ADDITIONAL programming plans for satellite in the coming six months or so. Times Mirror Company (Los Angeles Times et al) plans COMSTAR D2 (transponder 23, vertical) service starting perhaps April; **home shopping via TV and satellite**. Viewers will order via WATS line service, charge to card. When SATCOM 3R activates in fall, service will move to new bird and Times Mirror will also launch their own pay TV programming service. BBC back with plans to market to US for 46 hours per week of off-BBC-TV net programs. Bird and launch date unknown. **DOW JONES** using SATCOM FI, transponder 3 (WGN) vertical interval to transmit 'soft' financial news, analysis, reports drawing from multiple sources.

PRESSURES mounting to bring full time live coverage of **US Senate** to satellite, as C-SPAN has done for more than a year now with US House of Representative. Ultimate use of satellite described as 'extension of gallery seating' seems likely before this time next year.

WINTER CES gathering at Las Vegas included Downlink, Inc. demonstration of $5000/$7000 home satellite package (installed). Downlink appeared late at SBOC Houston, is aggressively pursuing establishment of network of dealers; perhaps 300 in all when mature. One unique part of package is spherical-**section** antenna with aluminum modular panels offering 8, 12 or 16 foot sperture size.

LARRY HOLMES, current heavyweight champ, has new 4 meter fiberglass dish with complete remote control system and 24 channel receiver; courtesy of H & R Satellite Systems.

CTV (Canadian Television) began operation on ANIK-B January 15th. New service is to provide network programs to northern Canada communities, is on interim permit basis pending formal final approval by CRTC within next two months. This expands program choices in Canada from CBC 'Northern Service' so that remote Canadians now have access to both of the major Canadian services. **ORBITEL**, previously known as Can-Com, is new effort to package 4 to 5 full transponders with programming for Canadian cable TV and northern communities. They plan September start date, possibly on ANIK-II and will package programs from regional networks and stations across Canada (BC-Tel, etc.) into 'custom service' which will be largely Canadian in content. Like CTV, they expect formal final approval from CRTC in hearings early in spring.

EVEN BEFORE CBS Cable launches mid-1981 cultural cable service on Westar III, firm is openly shopping for **second**

transponder; wants to use WESTAR III transponder for western time zones and new (yet unfound) transponder for eastern time zone feeds.

ONE POSSIBLE transponder available is TR 21 on FI (and later on FIIIR). Court decision to block start-up of Premiere service of movies brings FI TR 21 back onto market. Originally leased by Southern Satellite Systems for SPN service (now exclusively on WESTAR III, TR 9) transponder rights were 'sold' to Premiere in reported $5 million deal. With court decision that Premiere violates anti-trust laws 21 is now possibly again available.

COLUMBIA (country) has reserved spot on Ariane flight to launch a pair of SATCOL **domestic birds** in 1984. Meanwhile as reported elsewhere this issue Hector Posada in Medellin (Columbia) is experiencing results with home built 28 footer. He has well above threshold pictures on TR's 20, 24 (video) of D2 with US events fed into Caribbean and some preliminary indication that FI "is there". Further antenna work and stabilizing of his 28 foot dish ahead of him to confirm exact levels on FI channels noted.

In same part of world United States Tower Company has won contract for $250,000 huge spherical antenna 51 foot by 81 foot for firm called Cable America in San Jose, Costa Rica. Previous experience with FI reception in Costa Rica reported in **CSD** for May and June 1980.

CHANGE IN USE pattern of COMSTAR D2. Previously Puerto Rican video traffic has been sent down on D3 transponder 24. Since first of year heavy video use of transponders 20 and 24 on **D2** noted; presumeably for Puerto Rico since D3 service has disappeared. Audio and data traffic for Caribbean continues on D3 (transponders 4, 8, 12, 16, 20 and 24) while **video** on Caribbean 'spot beam' beam centered on San Juan can be on any of the same 6 transponders on D2.

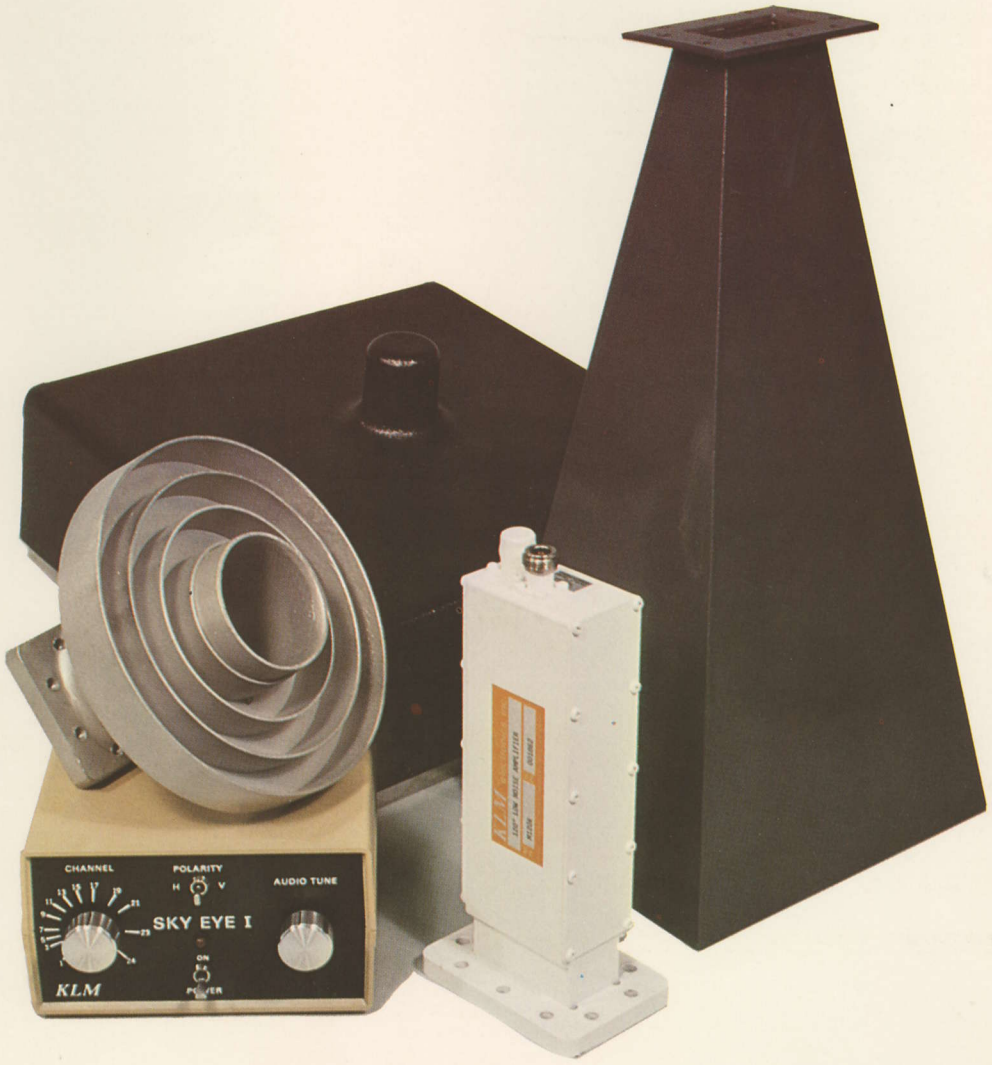
SBS has decided it wants three orbit spots (for 12 GHz birds) at 94, 97 and 100 degrees west. Present SBS-1 at 106 degrees will shift to 100 degree location. Next SBS (2) scheduled for launch late April and will home at 97 degrees.

COMSAT'a DBS group chairman John Johnson reports COMSAT labs engineers are working on 'signal encryption' system designed to make piracy of proposed 12 GHz DBS signals "an unlikely occurrence".

TED TURNER's CNN plans to launch a vertical interval 'tv Program Guide' service; it will update every 15 minutes listing everything on the air that day from any source (occasional feed programs via bird not included).

RCA PLANS to increase 'rates' for satellite time. There have been three classes of transponder service available. Unprotected service carries lowest rate (around $800,000 per transponder per year currently) and on this basis if your transponder fails you are out of luck. Further, if another with a higher class of service fails, you are apt to get bumped in favor of them. Middle class costs $1,000,000 per year and it is protected from bumping if another fails but not against failure of own transponder. Highest class of service costs $1,200,000 per year and it assures user of transponder even if the one leased fails. RCA wants to do away all but highest class, and raise rates by 17%. FCC is studying proposal, must approve rate increase because of RCA Common Carrier status.

MORE GOOD NEWS FROM KLM:



HI-PERFORMANCE LNAs & FEEDHORNS

You should already know about KLM's highly popular SKY EYE I satellite receiver. But maybe you didn't know that KLM is now supplying high performance LNAs and feedhorns for your custom systems.

The M120K LNA is KLM's own, with 120°K **OR BETTER** noise figure and built in DC block (fully compatible with the SKY EYE I).

The state-of-the-art concentric feedhorn, for parabolic antennas, provides optimum gain and carrier to noise figures. Combined with the M120K LNA it is a highly cost-effective way to ensure maximum system performance and crisp sparklie free video (similar advantages for spherical antennas are possible with KLM's SP-1 Rectangular feedhorn).

Prices? KLM's M120K LNA and feedhorns can offer you the same highly favorable performance-to-cost advantages as our SKY EYE I receiver. Dealers write on company letterhead for complete details.

KLM also manufactures complete satellite systems with a 5 meter screened dish or 12 foot solid aluminum dish. For information on any KLM product, contact:

KLM electronics, Inc.
P. O. Box 816, Morgan Hill, CA 95037
(408) 779-7363

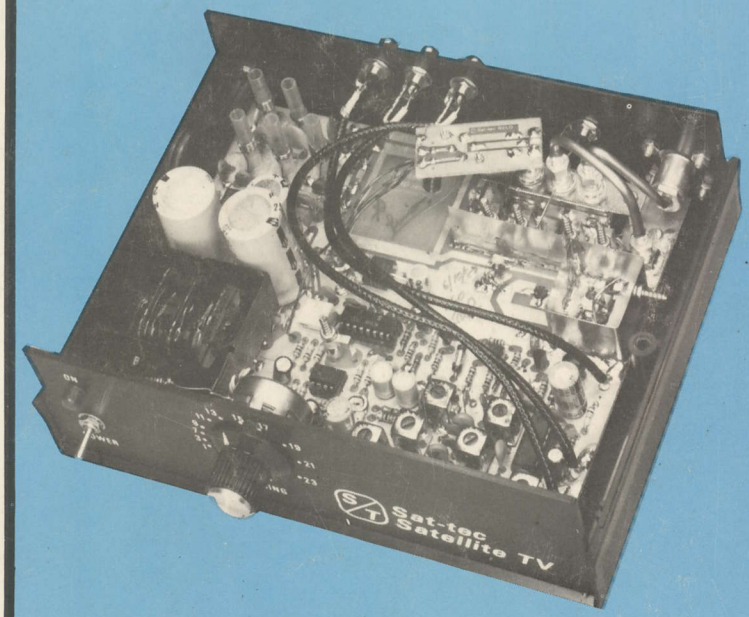
Sat-tec THE LEADER IN LOW COST TVRO

Introducing the R2 Satellite Receiver

A TV Satellite Receiver with all the features you need, at a price you can afford.

The Sat-tec R2 receiver is a versatile, consumer oriented unit designed for volume production. Easy operation and a clear, simple format makes the R2 idea for any application where non-technical users are involved. Fully frequency agile, the R2 may be used on 12 or 24 transponder birds, and since the tuning is continuous, foreign satellites such as Intelsat and Molniya can be received. A high performance AFC keeps the tuning accurate and sharp, fine tuning is not necessary. Standard one-volt P-P outputs for both audio subcarriers as well as video interface easily to any VTR or use the optional BC-1 modulator for direct TV set hook-up.

For a quality, low cost TVRO system, the Sat-tec R2 receiver can't be beat!



SPECIFICATIONS

Frequency Range:	3.5 - 4.5 GHz
Noise Figure:	12 dB, a 120° K 50 dB LNA and 10' dish provides good quality reception for most of USA.
Audio Subcarriers:	6.2 and 6.8 MHz standard, others available.
LNA Power:	15 volt at 150 Ma LNA Supply built-in.
Power Required:	110 VAC at 15 watts 50/60 Hz, 220 volt available.
Size:	8 x 6 x 3 inches, 3 lbs.
Price:	$995.00, completely wired and aligned; one year warranty.
Optional:	BC-1 RF Modulator Kit, tuneable channels 3-6 with sound....$24.95.

Sat-tec Systems

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